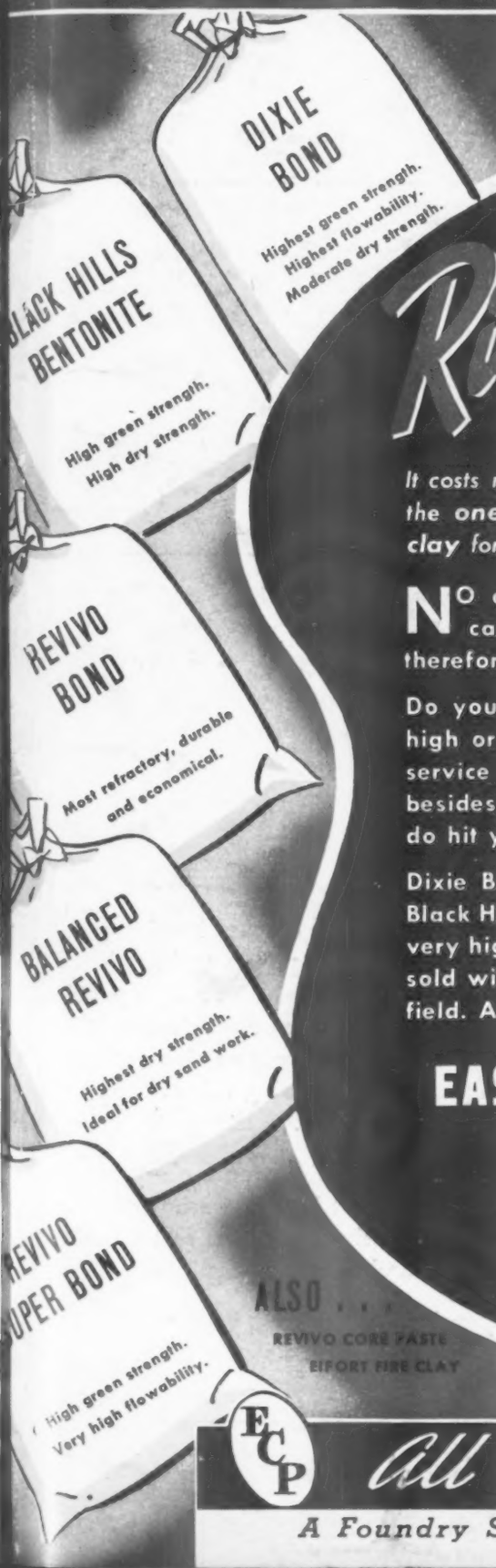
THE FOUNDRY



Right on the NOSE...

It costs no more to get the ***one right bond clay*** *for your purpose.*

NO one bonding clay can do all jobs equally well. Your castings vary greatly in size, shape and other respects. So, therefore, do your bonding clay requirements.

Do you want high green strength? high or low dry strength? high or low permeability or resilience? ECP'S SEVEN full-time service engineers have FIVE distinct products to work with, besides many "in-between" combinations. Result: we can and do hit your needs "right on the nose."

Dixie Bond is, we believe, the strongest bond on the market. Black Hills Bentonite has very high dry strength and hot strength, very high permeability and high resilience. All ECP products are sold with service based upon 19 years' specialization in your field. And *remember: this service is free for the asking.*

EASTERN CLAY PRODUCTS, INC.
EIFORT, OHIO

ECP has seven full-time service engineers on the go all the time, studying foundry problems at first hand, so as to recommend the one right bonding clay to give you the best results.

ALSO . . .
REVIVO CORE PASTE
EIFORT FIRE CLAY

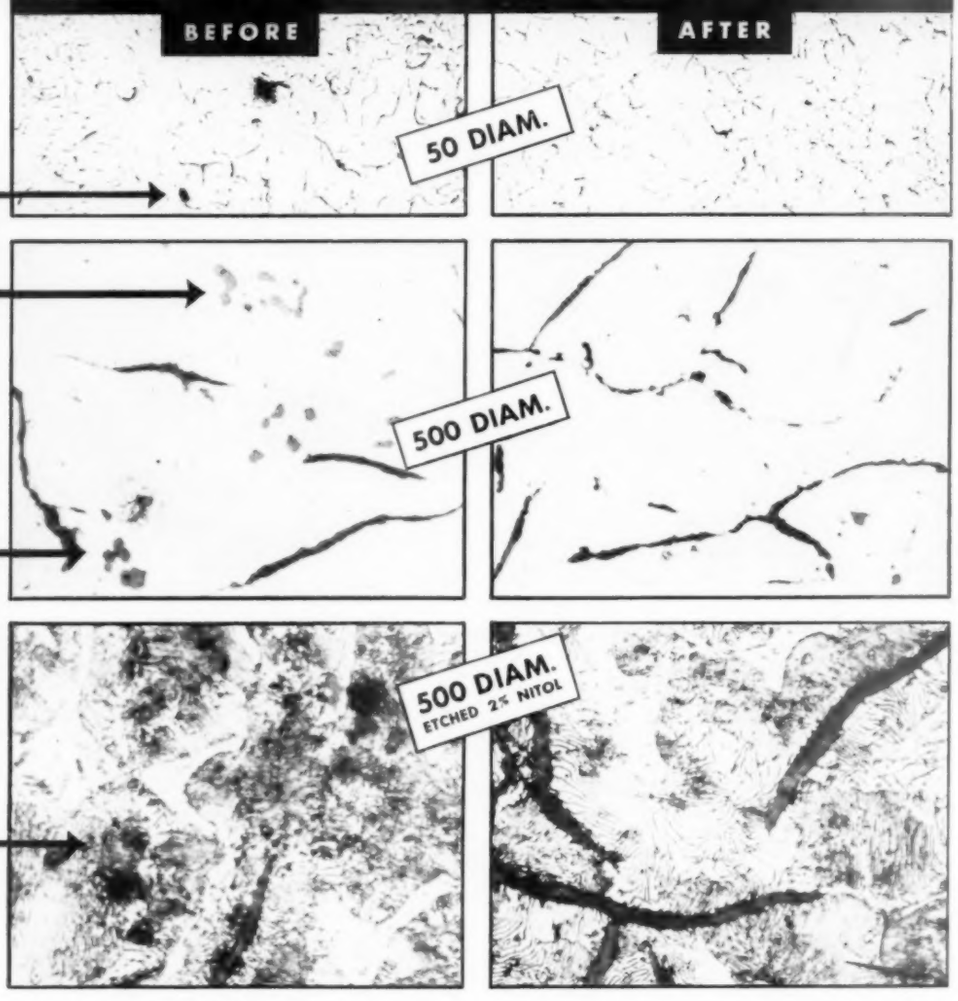
ECP

All TYPES OF BONDING CLAYS

A Foundry Sand Service Based Upon Practical Research

WASH OUT IMPURITIES... INCREASE STRENGTH AND MACHINABILITY... IMPROVE GRAIN STRUCTURE

REFINE WITH PURITE—THE SCIENTIFIC FLUX



These micrographs show the structure of a 100% scrap mixture, before and after refining with PURITE in a covered teapot ladle —4 lbs. of PURITE per ton. Note how PURITE washes out inclusions and eliminates segregation of impurities. The refining reduces sulphur, and prevents porous defects and hard spots in castings.

ANALYSES AND TESTS

	BEFORE	AFTER
Sulphur	0.137%	0.104%
Combined Carbon	.93	.79
Graphitic Carbon	2.45	2.57
Total Carbon	3.38	3.36
Silicon	1.84	1.83
Manganese	.30	.27
Phosphorus	.53	.54
Tensile Str. Sq. In.	32020 lbs.	33750 lbs.
Brinell Number	226	220
Machinability	30*	20*

*Time in seconds required to drill through 1" test bar with ¼" twist drill at 50 pounds pressure and 1700 R.P.M.

PURITE
THE SCIENTIFIC FLUX
THE MATHIESON ALKALI WORKS (INC.)
60 EAST 42ND STREET, NEW YORK, N. Y.
(Licensee of Metallurgical Development Company, Inc.)

● The speed-up in national defense has increased the demand for high test gray iron and semi-steel castings that machine easily and take a high polish. That PURITE will produce a strong, clean casting with high finishing qualities from an all-scrap mixture is in itself proof of its refining value as applied to ordinary foundry mixtures.

PURITE—whether used in the cupola charge or in the new elongated teapot ladle—washes out impurities and improves the soundness and machinability of gray iron and semi-steel castings.

Let us show you how to improve your castings by refining with PURITE, The Scientific Flux. Write us today.

New Motion Pictures for Users of Steel

AVAILABLE WITHOUT CHARGE FOR GOVERNMENT USE, AIRPLANE PLANTS, TANK FACTORIES, TRAINING CLASSES AND ALL MAKERS OF COMBAT MATERIALS

Bethlehem Steel Company has just completed two motion pictures designed to assist metallurgists, producers and learners in plants making war materials.

The films have been planned, photographed, and edited under the supervision of leading technical men of the company.

The purpose of the films is to facilitate the efficient handling of steel in its conversion to war-time products.

The films, while simplified as much as possible for the comprehension of the learner, are not designed primarily for entertainment or popular educational value. Hence response to requests from general groups such as luncheon clubs and similar bodies, must be deferred pending our meeting requests from war plants and training schools.

WHAT THE PICTURES SHOW

The pictures are on 16 mm. film, with sound-track, each running for about 40 minutes. The subject matter includes the following:

STEEL FOR THE ARMED FORCES
PART 1
HOW STEEL IS MADE

Blast furnace, bessemer furnace and open-hearth operations.

Animated drawings of what takes place in the blast furnace and open-hearth.

Control of slag in the open-hearth.

Spectrographic analysis.

Still cross-sections of bessemer furnace, electric furnace, and cupola furnace in the foundry.

Standard rolling operations.

Hammer forges and press forges.

Iron and steel foundry.

STEEL FOR THE ARMED FORCES
PART 2
STEEL TREATING AND TESTING

Wire drawing.

Special testing procedures.

Close-ups of inspectors at work.

Preparation of steel for re-rolling.

Animated time-temperature charts showing heat treating sequences.

Standard spark testing procedure.

Stop motion photographs of sparks held at the characteristic point to indicate presence of various alloys.

PROMPT REQUESTS SOLICITED

We shall make as many prints as necessary to supply promptly the requests from war producing and training groups. To lower our costs, any such groups are asked to apply for showings promptly so that we may estimate the number of prints which may be needed.

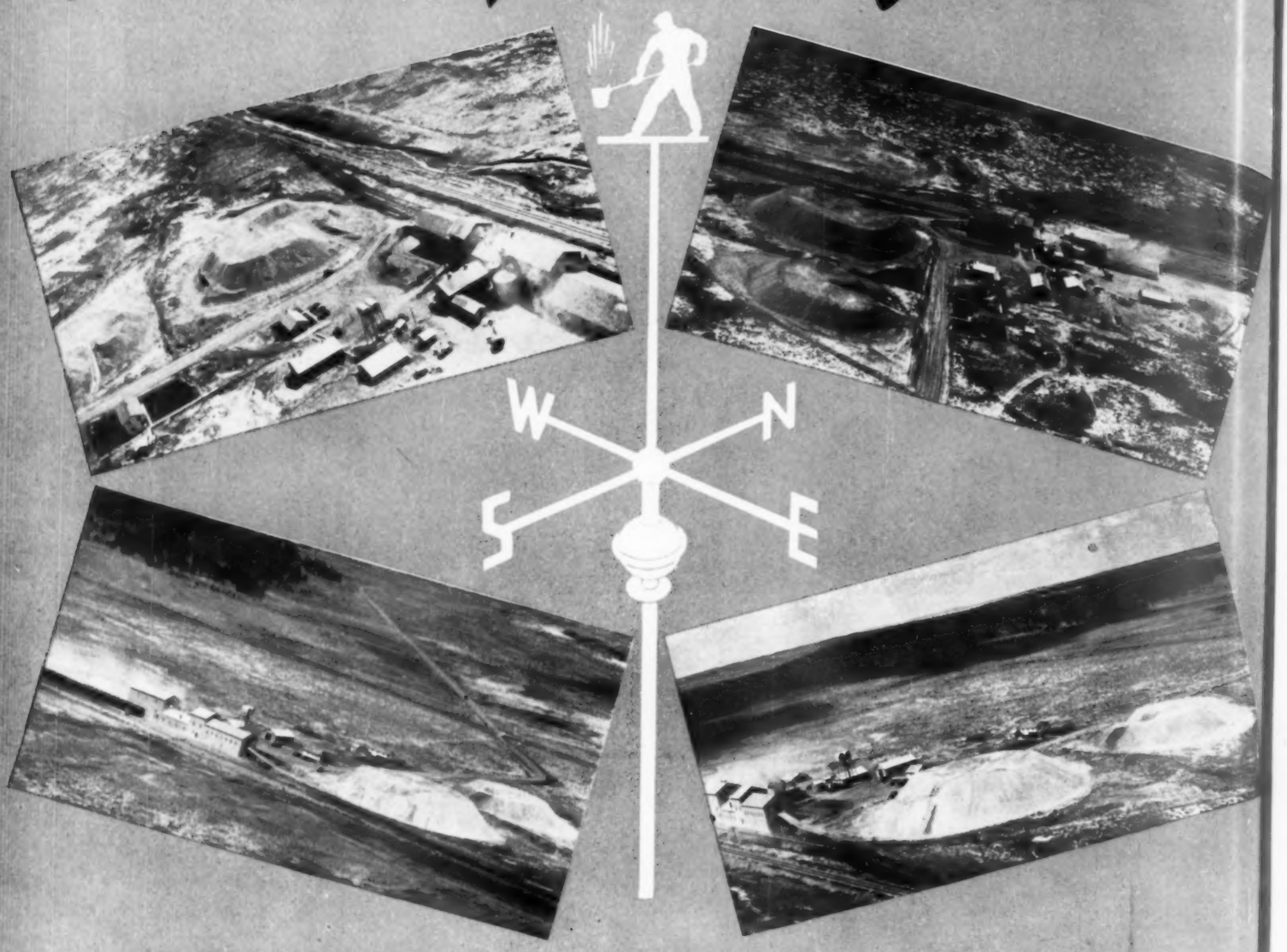
We also have a film library of special-product pictures such as the making of wire rope. Typical groups before which Bethlehem films have been shown in the past year:

Vought-Sikorsky Aircraft Corporation
Union Carbide and Carbon Company
Fleet Service Schools, Norfolk, Va.
San Antonio Air Depot
Springfield Armory
Watervliet Arsenal
Princeton University
Henry Ford Trade School
Purdue University
Inspectors School of Naval Material
Pennsylvania State College
University of Pennsylvania
General Motors Institute
Rensselaer Polytechnic Institute
Frankford Arsenal
Cleveland Ordnance District
University of British Columbia
Virginia Military Institute
Springfield, Ohio, Foremen's Club
Foster Wheeler Corporation
Sun Oil Company

BETHLEHEM STEEL

HOW TO ORDER—*If you represent a war material plant or training group kindly write stating position, name of group, dates you desire the films and optional dates. State length of time you desire to hold prints. There are no charges except return expressage. Address Motion Picture Office, Room 841, Bethlehem Steel Company, Bethlehem, Pa.*

From Any Point of View!



It's FEDERAL GREEN BOND!

• Regardless of how you look at it, you can't buy a better bentonite than Federal Green Bond.

Looking for service? Take a good look at the two huge stock-piles pictured above and you'll realize that Federal is geared to get your orders out quickly.

If you look for uniform strength, you'll appreciate the fact that production of Green Bond is laboratory-controlled from mine to bag. Uniform high strength is guaranteed by this method.

In addition to the above, Federal offers you a greater background of experience with foundry bentonite than you could probably find elsewhere.

If you use bentonite, specify Federal Green Bond the next time. You'll be glad you did.

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THE FOUNDRY

for FEBRUARY 1943

VOLUME 71 NUMBER 2

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from outboard motors

Wisconsin Cylinder Foundry Co., of Racine, specialists for years in light castings for pleasure craft, find transition to heavy war work easy with Linoil. "With Linoil we can make all kinds of cores," says the Big Boss, indorsing the findings of many other foundrymen who rely upon Linoil in these days of rapid change. With a "must" delivery date on the work going through and any man's guess what comes next, it is good to have Linoil on the job.

LINOIL

The things your best friend will tell you about Linoil are that it is a uniform oil and that it is a powerful binder, that it is a fast dryer, that it gives good cores to the molder, and cuts the percentage of reject castings, that it speeds up the cleaning. A great many foundrymen are familiar with Linoil, some have used it since war work became heavy, some have used it twenty-five years. Ask any of them about Linoil and then send for the Linoil man.

The use of dependable oil always important in the foundry, is doubly important today - Linoil for dependability, Linoil for economy.

THE WERNER G.

(DIVISION OF ARCHER-

2191 WEST 110 STREET WOODBINE

...rs to ¾-ton tool bases

WISCONSIN CYLINDER FOUNDRY CO.
INCORPORATED
RACINE, WISCONSIN
PHONE JACKSON 4804
1808-18TH STREET

December 2, 1942.

THE WERNER G. SMITH COMPANY
(Division of Archer-Daniels-Midland Company)
2191 West 110th Street
Cleveland, Ohio

Gentlemen:

We have your letter of November 30th regarding pictures taken of cores made from Linoil.

Our experience with Linoil has been satisfactory in every way. We find that with Linoil we can make all kinds of cores and the Oil serves our purpose for any size of core that we require. In our many years of experience we have found Linoil to be the best.

The cores shown in the picture are all oil cores although some of the large cores have coke centers; the approximate weight of the assembly of cores is 1800 pounds and the casting weighs 1500 pounds.

The men shown in the core picture are both core makers, Tony Valukas at the left and Joe Muleski at the right.

The man shown beside the finished casting is Mr. Arne Fischer, superintendent.

Hoping this gives you the desired information, we are

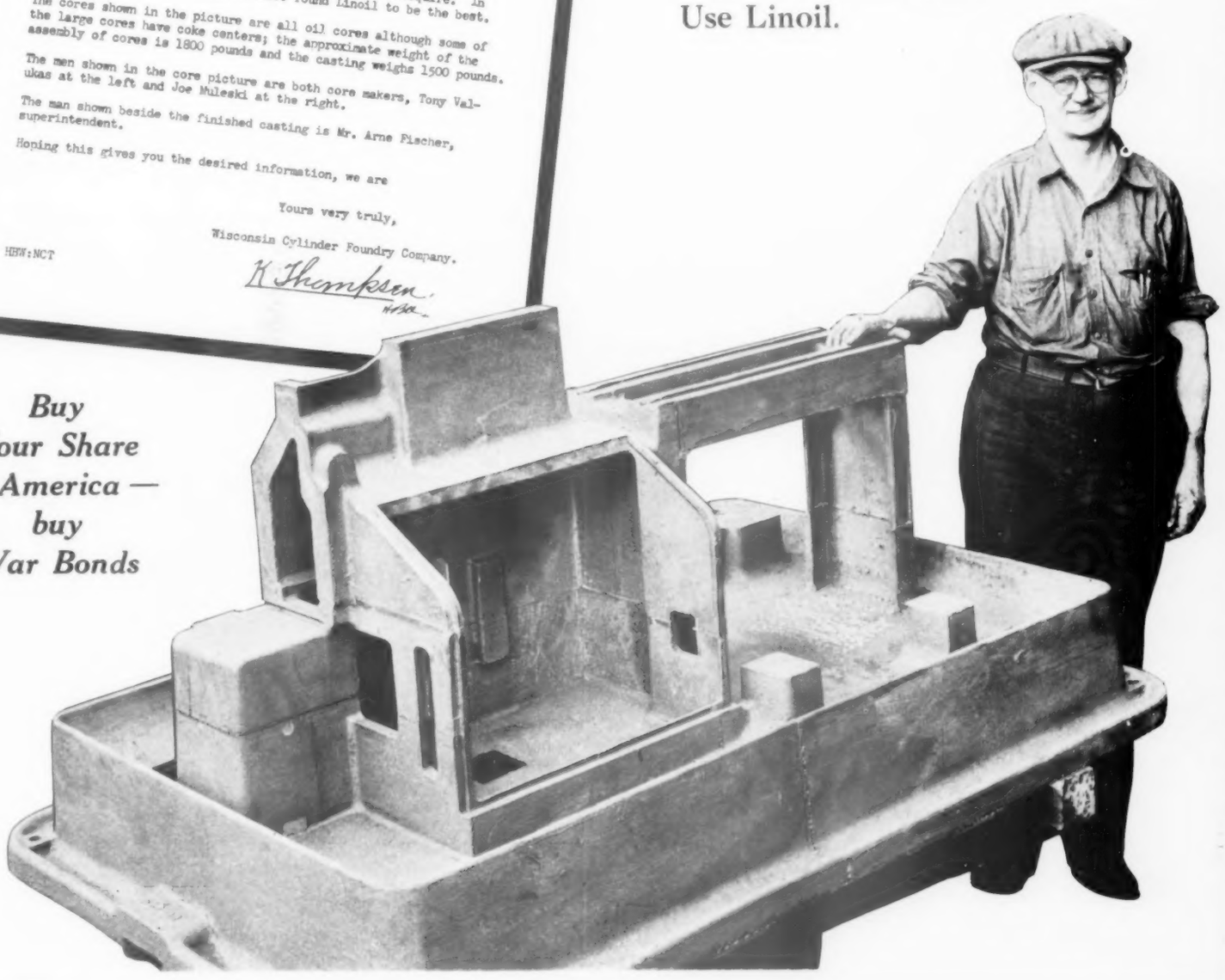
Yours very truly,

Wisconsin Cylinder Foundry Company.

HBW:MCT

H. Thompson
H.B.W.

In large castings an economy in oil sand lies in the certainty with which the pattern maker works. Oil sand cores dry true to the core boxes, eliminating trial and error work, and eliminating margin of safety metal that must be later machined off. Use Linoil.



Buy Your Share in America — buy War Bonds

SMITH COMPANY

DANIELS - MIDLAND COMPANY)

4690 CLEVELAND, OHIO

Speed is Vital

HEADQUAR
AIR AND AIRLESS BLAST C

SPEED IS VITAL IN BLAST CLEANING. Speed in solving cleaning room problems—and speed in producing finished work.

Since its beginning in 1904, Pangborn Corporation has recognized the importance of speed cleaning. Year by year new goals of performance have been set—met—and passed by equipment that is constantly being improved and redesigned by our engineers working with our customers.

For more than a third of a century—through two world wars—Pangborn equipment has grown—step by step—with our customers. Concerns that were small twenty-five to thirty years ago are now the nation's great automotive industries, metal plants and war production units. We served them "then"—and we continue to serve their greatly magnified needs today. Simply because *our* cleaning and dust control equipment has grown and expanded with *their* growth and expansion.

That's why Pangborn is recognized throughout industry as HEADQUARTERS for everything modern and up to date in blast cleaning performance. Our experience and our equipment invites your consideration. For prompt, time-shortening, dollar-saving answers to cleaning problems "COME TO PANGBORN."

WORLD'S LARGEST MANUFACTURER OF BLAST

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RTERS FOR S CLEANING EQUIPMENT

CLEANING AND DUST CONTROL EQUIPMENT

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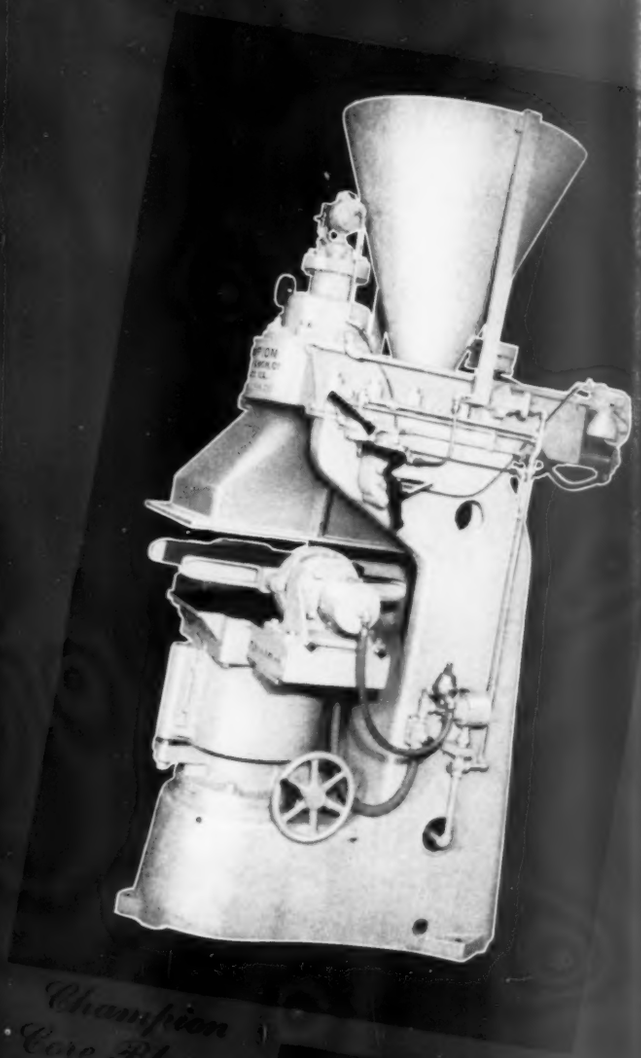
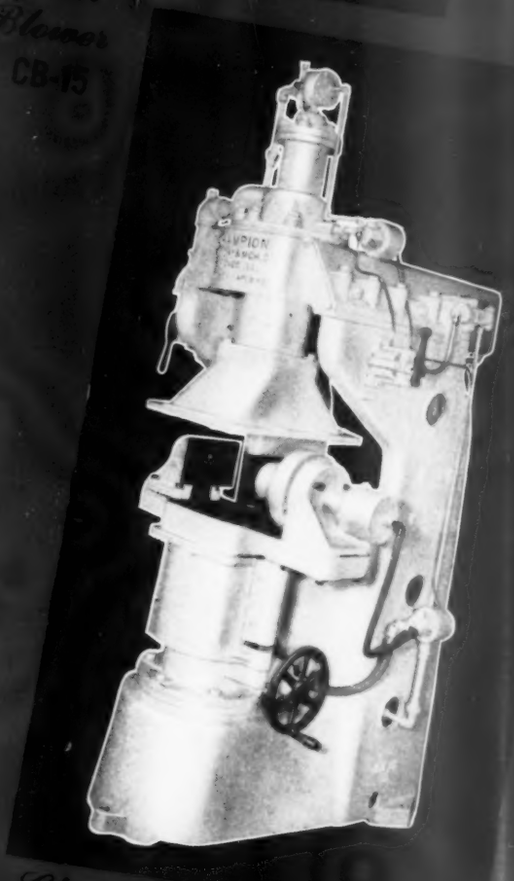
HAGERSTOWN, MARYLAND

Champion

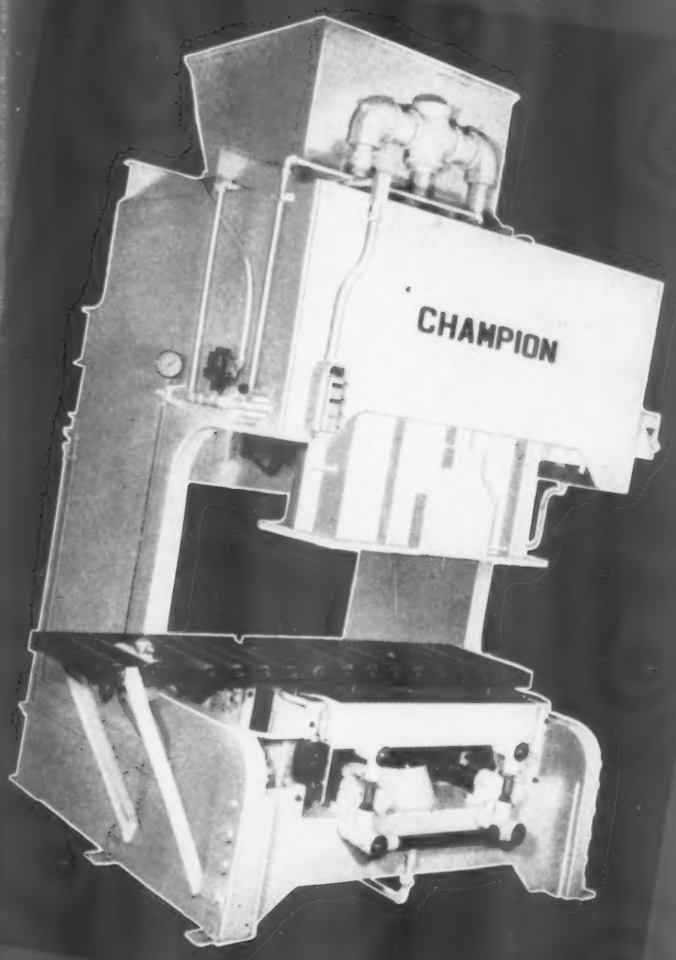
Core Blowers May Be the Answer to Your Man-Power Problem

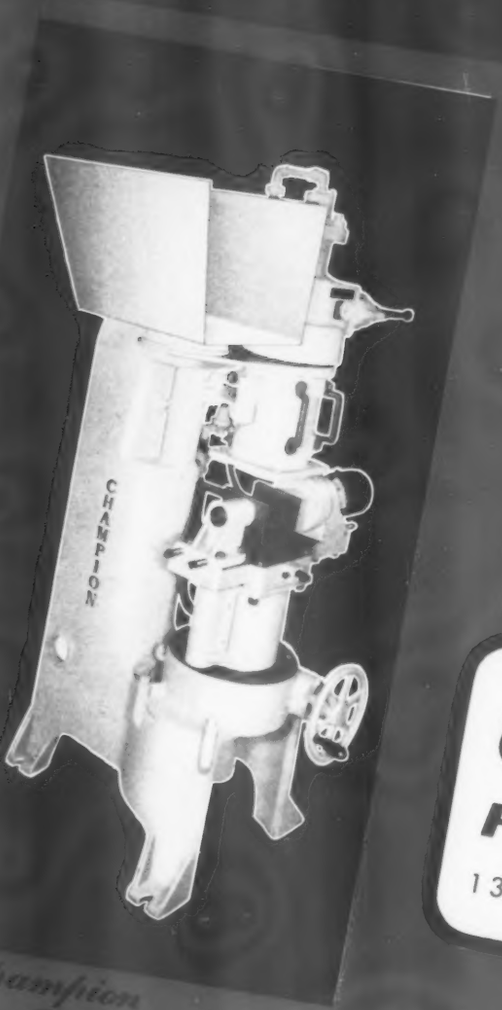


Champion
Core Blower
MODEL CB-13



Champion
Core Blower
MODEL CB-12





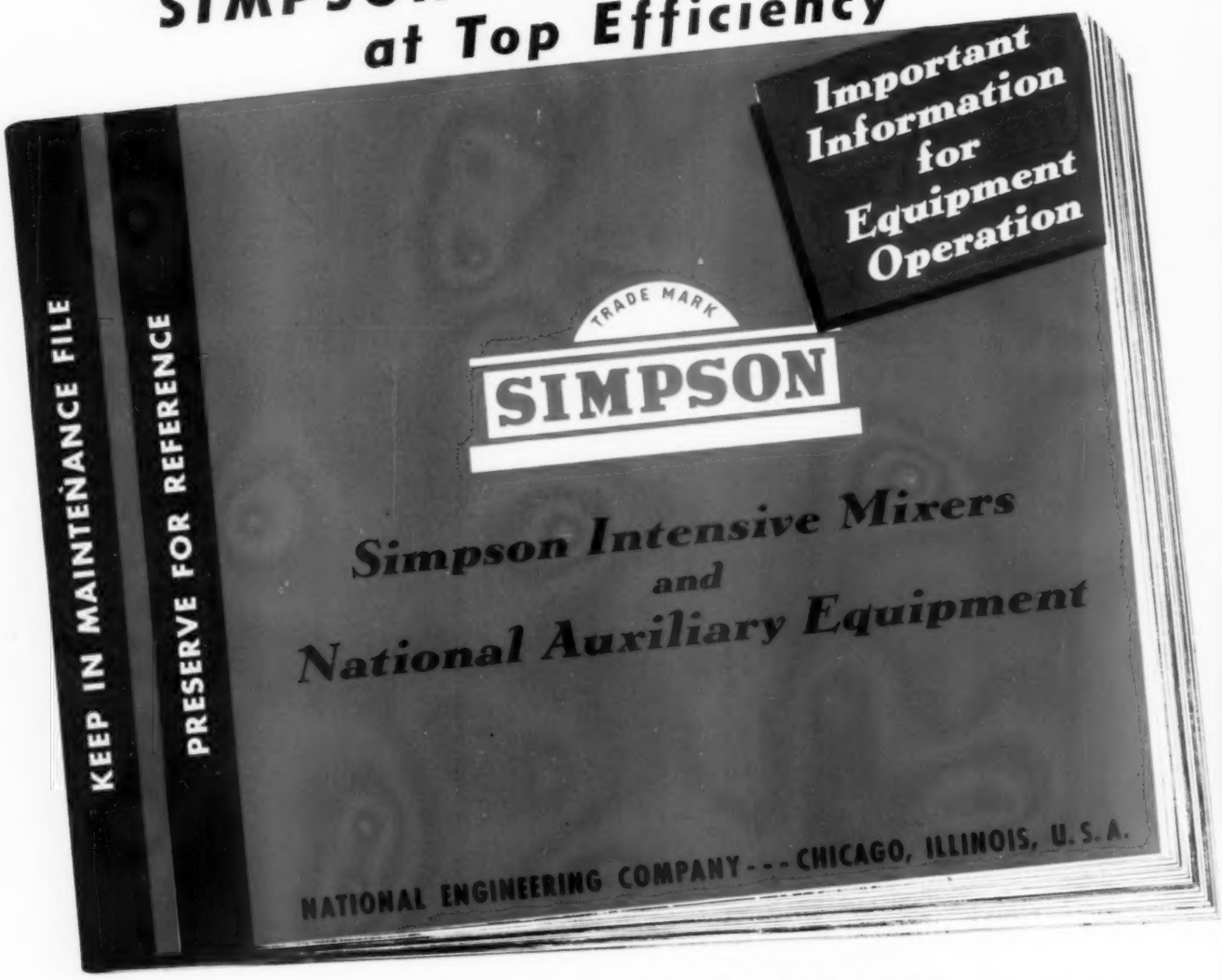
Champion Core Blowers have designed yesterday's experience into today's requirements. Any man, woman or child can economically produce perfectly rammed cores with these modern machines. The operator merely sets the box, pulls the lever and the core is perfectly rammed. Regardless of core size—small or large—the ramming time is identical. Every core rammed by a *Champion* is uniformly accurate. A single valve operates the core box clamp, clamps same against the blow plate, blows the core, exhausts and releases the clamps in the proper cycle. A *Champion* is always the best bet when *impossible* production schedules must be faced.

CHAMPION
FOUNDRY & MACHINE CO.
1318 W. 21ST STREET, CHICAGO

★★ PEAK PRODUCTION DEPENDS

this service manual will help keep

SIMPSON MIXERS operating at Top Efficiency



THE maximum productive ability of every Simpson Mixer is a vital need in hundreds of foundries producing war castings. Production must be kept at the peak. That is why the Simpson Service Manual has been sent to users of the thousands of Simpson Mixers now in service — and will also accompany each new unit shipped. All the important details of installation, adjustment, operation, maintenance, lubrication, parts and auxiliary equipment are included in the manual. It is an aid to assure the ultimate of quality-quantity output of perfectly conditioned sand—for which Simpson Mixers are famed.

National Field Service, well known for its ever ready cooperation, is quickly available wherever Simpson Mixer users need it. On any of your problems of sand handling and control a National Service Engineer, with practical foundry experience, will be glad to work with you.

If you have one or more Simpson Intensive Mixers in your foundry you have received your manual, *if you would like another please write us.*

If you haven't a Simpson Mixer ask for details on the operating advantages of this machine—why it produces at the lowest net cost per ton of properly mulled sand for magnesium, aluminum, brass, bronze, steel, malleable and iron castings.

UPON EFFICIENT MACHINES ★ ★

This installation view, from the Simpson Service Manual, illustrates the advantages of a well planned installation. It shows 2 No. 3 Simpson Mixers with control panel conveniently located for the most efficient operation.

Did you get your Simpson Casting Weight Calculator?

If you haven't, ask us for one of these simple, easier-to-use calculators—with it you can quickly estimate weights of all types of castings, ferrous and non-ferrous, as well as wood patterns, refractories, etc. Free to Foundry executives, engineers and personnel writing on company letterheads.

SIMPSON INTENSIVE MIXERS

NATIONAL ENGINEERING COMPANY

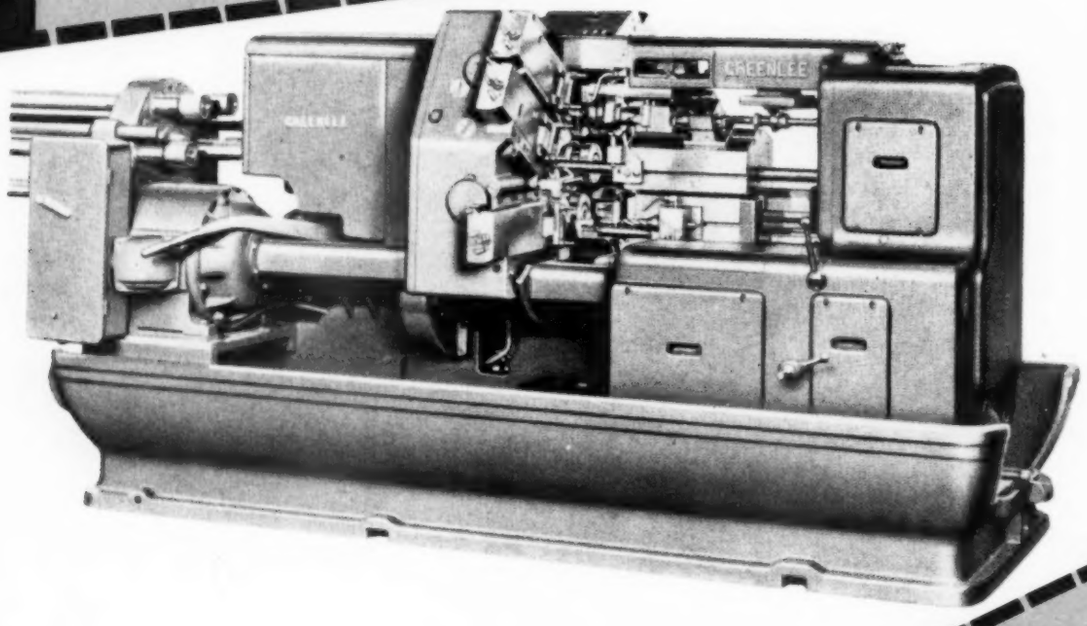
MACHINERY HALL BUILDING • CHICAGO, ILLINOIS

Manufacturers and Selling Agents for Continental European Countries:—The George Fischer Steel & Iron Works, Schaffhausen, Switzerland. For the British Possessions, Excluding Canada and Australia—August's Limited, Halifax, England. For Canada—Dominion Engineering Co., Ltd., Montreal, Canada. For Australia and New Zealand—Gibson, Battle & Co., Pty., Ltd. Sydney, Australia

HYDRO-BLAST

AT GREENLEE BROS. & CO.

Cleans Cylinder Head Machine for Wright Aeronautical and Reduces New Sand Purchases to One-Half of Former Requirements



Greenlee Six-Spindle Automatic Screw Machine used primarily for producing 37MM shell casings. For obvious reasons, we are not permitted to illustrate the cylinder head machine made for Wright Aeronautical.

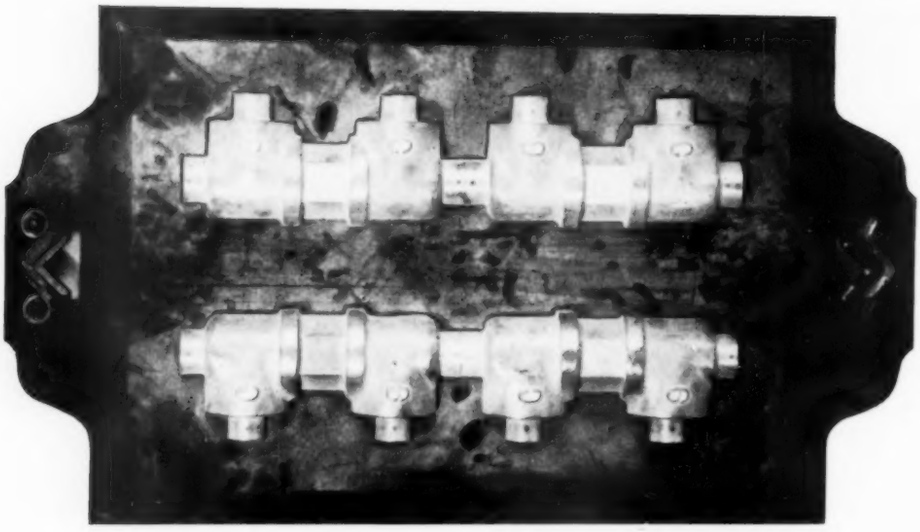
When Greenlee Bros. & Co. build their special machine tools for mass production of aircraft engines, they depend upon the Hydro-Blast to clean the castings to microscopic cleanliness. Every casting used in the Wright Aeronautical 110 station cylinder head machine is Hydro-Blasted, as well as all other castings poured in the Greenlee foundry—30 to 35 tons of metal being poured every 16 hours and cleaned by a single gun Hydro-Blast.

Says foundry manager F. E. Rundquist: "While we have by no means reached peak production with our Hydro-Blast, we are recovering 10 to 15 tons of sand every 16 hours, and have reduced our purchases of new sand to half of our former requirements."

Hydro-Blast is again proving its capacity to save enough transport ton miles, labor and sand to pay for itself within one year.

he Hydro-Blast Corporation 2550 N. Western Ave. CHICAGO

LIGNOLITE



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. . . are flat and stay flat because LIGNOLITE has high transverse strength and resistance to deflection. It is impervious to moisture and does not warp from contact with wet sand or high humidity. This tough laminated lignin plastic is also highly resistant to oil, grease, dilute acids, etc. In addition, LIGNOLITE is half the weight of aluminum thereby combining the most desirable qualities so necessary in pattern plates: FLATNESS, LIGHT WEIGHT, and STRENGTH. This material, moreover, is abrasion proof, of uniform caliper, and may be easily machined, sawed, drilled, tapped, etc. Available in all flask sizes $\frac{3}{8}$" to 2" thick or in sheets for own cutting. Please write for sample and complete information.

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DIVISION OF MARATHON PAPER MILLS COMPANY

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Sound Castings and Fewer Discounts

wherever one of the 4,800 Royers is on the job!

War's demands on America's foundries call for an ever increasing production of sound castings—on time and without fail. Unprecedented output with minimum losses seems like a paradoxical requirement, but it must be met if armament manufacturers are to maintain their schedules. Much depends on the conditioning of your sand. Only the best method is good enough today.

Proper sand conditioning, provided by Royer Sand Separators and Blenders, speeds production and cuts discounts sharply. Reduced molding time, better molds, smoother castings and less cleaning time—these are among the results which follow putting Royers to work on a sand heap. 44% of Royer users are "repeat" users because it is the only equipment which gives them essential "six point" sand conditioning:

1. Thorough refuse removal
2. Positive lump breaking
3. Complete blending and mixing
4. Even distribution of moisture
5. Increased permeability
6. Double aeration; on the belt and in discharging

One of the eight portable and stationary Royers is just what your shop needs. There's a size and type for every foundry: iron, steel, malleable and non-ferrous.

Write for full information, including delivery dates on your priority requirements.

THE ROYER

ROYER FOUNDRY & MACHINE CO.
159 Pringle St.
KINGSTON, PA.

ROYER FOUNDRY & MACHINE CO. KINGSTON, PA.

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THE ST. PETERS

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"THE ROUNDEST GRI

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FINE SILCA

FROM THE WORLD FAMOUS STPET

A. F. A. GRAIN FINENESS—60

SIX CARSPE

We Invite Comparison

MICROSCOPICALLY–for Roundness of Grain.
CHEMICALLY–for Purity.

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A. F. A. GRAIN FINENESS—70

RS PER DAY

Be Sure of Your Requirements by Contracting with Us

IN MINES & MILL—JUDA, WISCONSIN

These are our products

Volclay

WESTERN BENTONITE

Strongly entrenched
by 15 years of success
in foundry work.

Panther Creek

SOUTHERN BENTONITE

Combining the highest
Green Strength with
low Dry Strength.

AMERICAN COLLOID COMPANY

363 WEST SUPERIOR STREET • CHICAGO, ILLINOIS

Deposits and Processing Plants

WYOMING SOUTH DAKOTA MISSISSIPPI

Did you get the new bulletin?

"HEAT PENETRATION INTO FOUNDRY MOLDS AND ITS EFFECT ON SAND"

Deals with bentonites, fireclays and natural molding sands and their transition from hot strength into baked strength and collapsibility. . . . . Postcard brings free copy. No obligation!

Now Unfurled above our plant to mark the achievement of THOSE WHO WORK "BEHIND THE LINES"

The patriotic zeal of the men and women workers of Acme is symbolized by the Army-Navy "E" awarded for outstanding achievement in the production of war materials. Acme workers share with all Americans a stirring pride in the valorous action of our boys on the fighting fronts. Here at Acme we fully realize that the future of our families, our homes, our country depends upon the boys at the front and our ability to give them the weapons and equipment they must have. Among them are our husbands, brothers, sons. We will not let them down! We are proud of the "E" Emblem on our lapels, as a decoration for past production achievements. We accept it as a compelling challenge to even greater production in the days that lie before us.

For VICTORY buy WAR BONDS and STAMPS

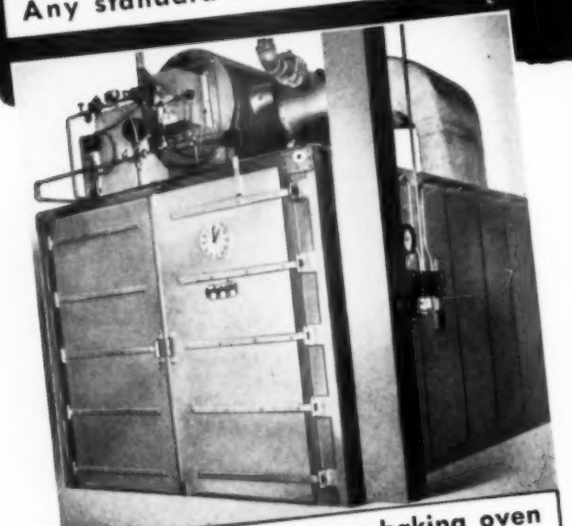
Acme for Action!

ACME PATTERN & TOOL COMPANY INC., DAYTON • OHIO

Heat-Treated Aluminum Aircraft Castings • Patterns • Tools • Tool Designing • Production Processing

Recent Survey Reveals *Success of* NEW MAGNESIUM CORE OVEN FEATURES

Any standard core baking oven



A new Despatch core baking oven for a new job

Realizing the need for a special core oven design to bake magnesium cores, foundrymen called on Despatch to work out new oven features which would assure normal production with the troublesome new binder formulae.

Aware of the effectiveness of the Despatch system which controls heat with proper distribution of heated air throughout the work chamber, they sought a modification of the system suited to the new problems presented in the magnesium foundry.

Despatch has supplied these added features of construction to the complete satisfaction of the technical staffs of leading magnesium producers and fabricators. By adapting certain features to convection type core oven designs, magnesium core-baking production is now handled with ease.

Whether you need new ovens, or modifications of present ovens to handle magnesium cores, call in a Despatch engineer at once. No obligation for a complete analysis of your magnesium oven requirements.

VALUABLE DATA NOW AVAILABLE

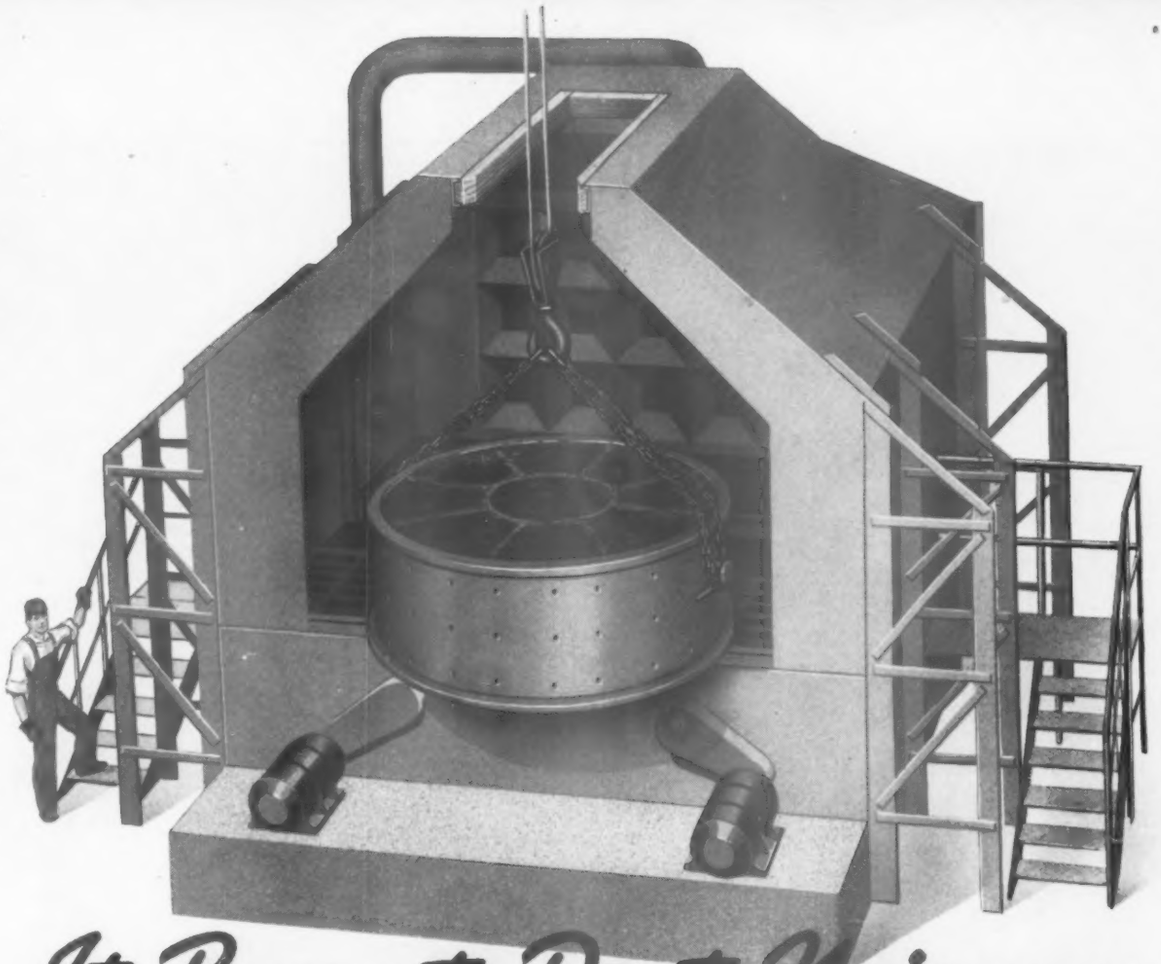
Valuable data you can apply to your magnesium problems have been collected by Despatch Engineering Service. The material is urgent and semi-restricted, so will be supplied only on your personal request. Write today!

Foundrymen OK DESPATCH CORE OVENS

Careful production checks of Despatch magnesium core-baking ovens in leading foundries reveal that in all cases foundrymen approve the built-for-magnesium features . . . claim excellent production of high quality cores . . . and maximum efficiency.

Phone GEneva 7765
(MINNEAPOLIS)
for immediate assistance on all magnesium core-baking oven and heat treating furnace problems.

DESPATCH OVEN COMPANY MINNEAPOLIS



It Prevents Dust Nuisance

when shaking out large heavy flasks

● 16 feet wide, 14 feet deep, and 17 feet high,—and with 24 Bartlett-Snow pyramidal shaped dust collecting orifices mounted in the backwall (U. S. Pat. 121,704, July 30, 1940),—this dust house provides a means of shaking out large dry sand molds, in a confined space, without contaminating the air in the plant.

A slot in the top of the house provides free travel for the crane cables and permits flasks weighing up to 25 tons or more to be placed accurately on the four heavy duty shakeout machines within the house. The sand drops through to the collecting hopper underneath. The dust, smoke, etc., are exhausted through the orifices in the backwall into a plenum chamber which is connected to a dust collector located outside the building, sufficient velocity being provided to prevent dust from drifting out through the frontal opening. Inspirator jets, placed at proper distance around the entire periphery of the crane cable slot, overcome any tendency of dust and smoke to find exit through the slot, thus insuring nuisance and dust free operation at all times.

Our recently issued 40-page Foundry Bulletin No. 91 describes Bartlett-Snow dust collecting and other foundry equipment in detail, and contains much information of interest to every foundry manager and operating man . . . Send for a copy today.

THE C. O. BARTLETT & SNOW COMPANY
6201 Harvard Avenue **Cleveland, Ohio**
Engineering and Sales Representatives in the Principal Cities

BARTLETT-SNOW

ENGINEERS AND FABRICATORS FOR THE FOUNDRY INDUSTRY

Complete Sand, Mold and Castings Handling Equipment for any requirement, including

Shakeouts	Elevators	Aerators	Sand Distributors	Bins and Feeders	Apron Conveyors	Dust Collectors

PRODUCTION RULES FOR EFFICIENCY

For More and Better Grinding

IN FOUNDRIES AND STEEL MILLS

WHEEL SPEEDS: 1—For Resinoid Bonded Wheels—constant wheel speed of 9,500 surface feet per minute will maintain most economical wheel cost.

2—For Vitrified Bonded Wheels—constant wheel speed of 6,500 surface feet per minute will maintain most economical wheel cost.

3—Constant surface speed should be maintained as the Grinding Wheel decreases in diameter through use. The speed of the spindle should be increased correspondingly as the wheel diameter decreases. This can be accomplished by means of a variable speed countershaft or cone pulley on the grinder or by transferring from a larger grinder to a smaller one with higher spindle speed.

GRINDING PRESSURE: 1—Increased economy may be obtained by increasing the pressure (or direct load) at the point of grinding contact to the extent where lowest total grinding cost is obtained. The best pressure to use can be determined by test.

2—Too much grinding pressure will break down the wheel and increase grinding cost per pound of metal removed. Select the proper grade of wheel so that too much pressure need not be applied to obtain maximum cutting rate in relation to wheel wear.

GRINDING MACHINE: 1—The grinding machine, whether floor stand or swing frame, should be as free from vibration as possible. Vibration tends to break down the wheel and causes excessive wheel wear. Spindles should be rigid and run true and free, bearings should be in excellent condition and wheel mounts true and up to size.

GRINDING OPERATOR: 1—The workman's knowledge of the tool he is using, and its limitations, is the most important factor in obtaining most efficient use. This is particularly true of Grinding Wheels.

2—Use a Grinding Wheel with care; do not "abuse" it by "edging" it, or by bumping the work, or by applying too much pressure.

3—Proper use of the wheel will produce the same number of pieces per hour and will give longer wheel life.

GRINDING WHEEL SELECTION: 1—Use the grain and grade combination that will give best results. In general, use coarse grain sizes (12, 14, 16, 20, etc.) and hard grades (P, Q, R, S, etc.).

2—On high speed grinders use Resinoid Bonded Wheels at 9,500 surface feet per minute. On low speed grinders use Vitrified Bonded Wheels at 6,500 surface feet per minute.

3—For grinding steel castings, billets, forgings and annealed malleables use ***Borolon*** (Aluminum Oxide) WHEELS.

4—For grinding gray iron castings, unannealed malleables, brass, bronze and aluminum use ***Electrolon*** (Silicon Carbide) WHEELS.

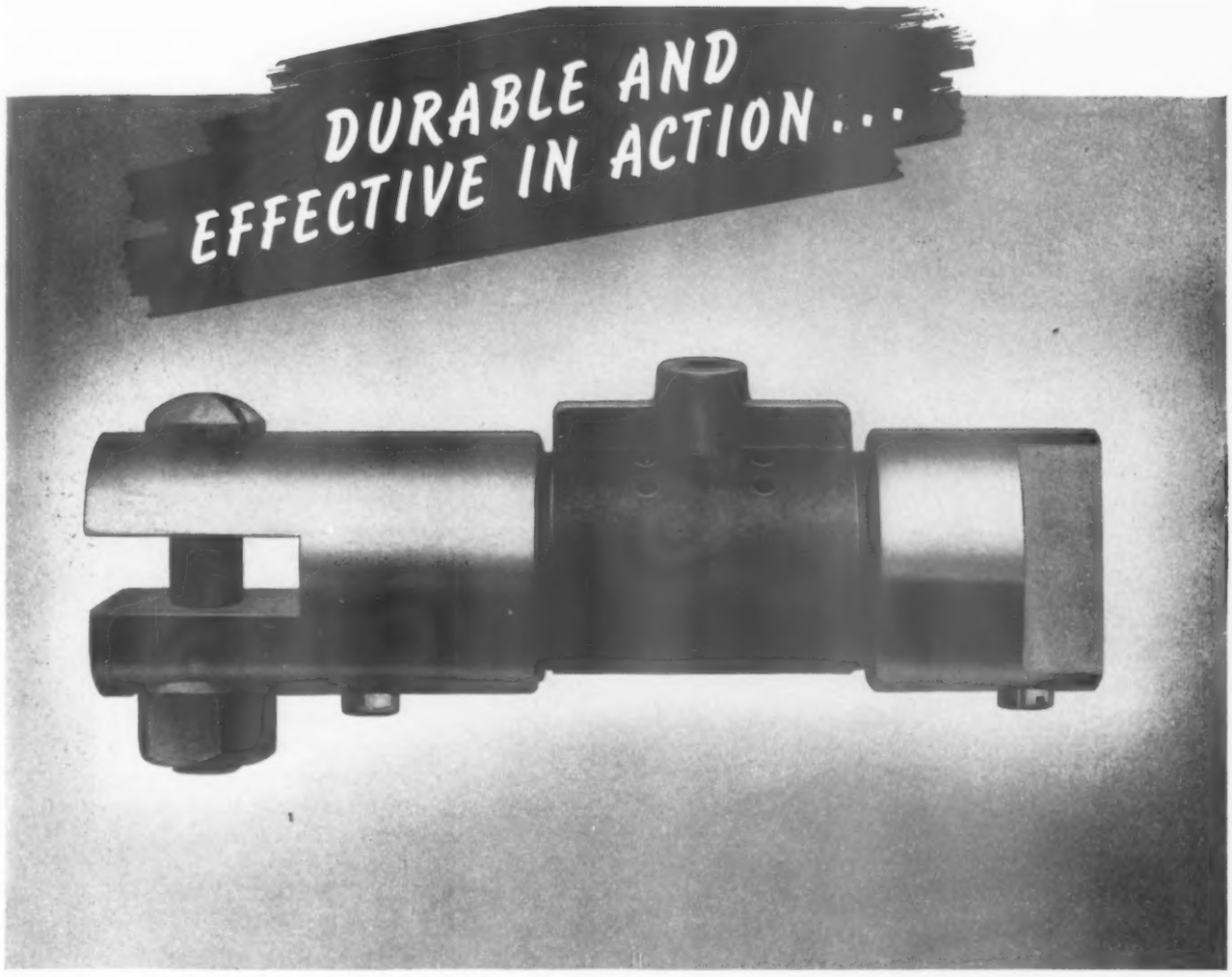
Close attention to the above details will mean more production from your grinding operations—and more GUNS, TANKS, TRUCKS, SHIPS and PLANES TO "SPEED VICTORY"!

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

TACONY & FRALEY STS., PHILADELPHIA, PA. • CHICAGO BRANCH: 127 SOUTH GREEN ST.

DISTRIBUTORS IN ALL PRINCIPAL CITIES



★ ★ TABOR PNEUMATIC VIBRATORS

Probably no foundry molding machine part is subjected to heavier or more severe duty than that of a pneumatic vibrator. Tabor Vibrators are the result of over a half-century's experience and are built to return unfailing, continuous service.

The body is a drop forging having a steel cap screwed on each end to eliminate body distortion. A felt oiler is positioned behind a hardened steel anvil in each cap, and the alternate compressing and decompressing of the felt by the air squeezes out a minute supply of oil at each stroke. Consequently, steady and adequate lubrication is assured without oil being blown through the exhaust. Pistons are of hardened steel and are lapped to an accurate cylinder fit.

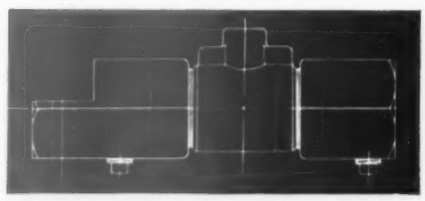
All Tabor Vibrators are carefully assembled and thoroughly tested before shipment. Made in piston diameters of ⅝", ¾", 1", 1⅛", 1½" and 2".

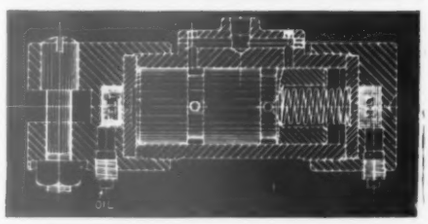
TABOR
TRADE 1884 MARK

- **Foundry Molding Machines**
- **Foundry Equipment**

and

- **Tabor - Brasive Cut - Off Machines in all sizes and types.**





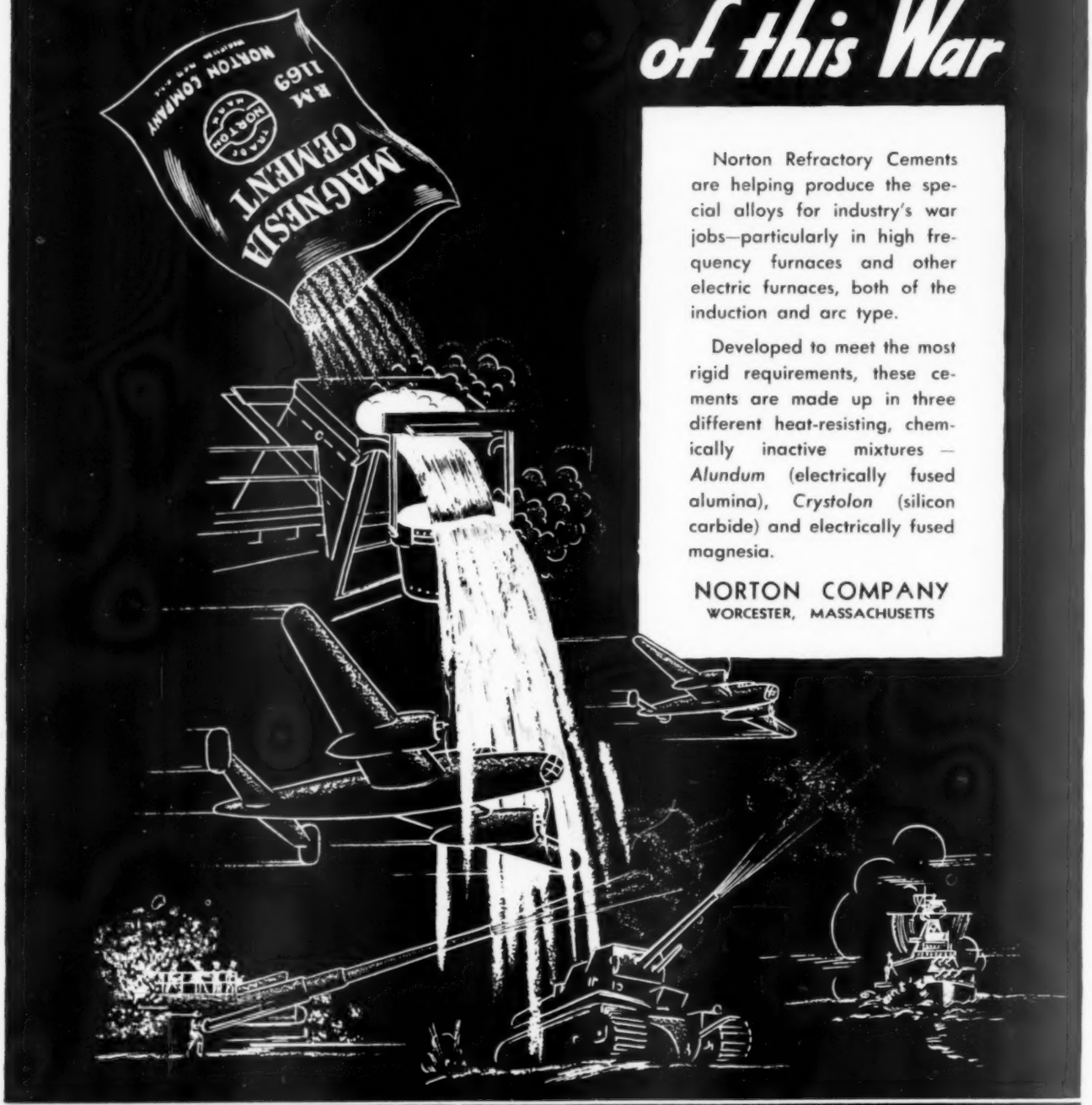
Tabor Vibrators of less than 1" piston diameters have heads with a single shoulder as shown in the upper drawing. Vibrators of 1" and larger piston diameters are furnished with a slotted head as shown in the lower sectional drawing.

THE TABOR MANUFACTURING COMPANY
6225 Tacony Street • Philadelphia • Pennsylvania

Representatives: Snyder Foundry Supply Co., *Los Angeles, Calif.;* Pacific Graphite Works, *Oakland, Calif.;* Carl F. Miller & Co., *Seattle, Wash.*

NORTON REFRACTORY CEMENTS

Helping produce the special alloys of this War



Norton Refractory Cements are helping produce the special alloys for industry's war jobs—particularly in high frequency furnaces and other electric furnaces, both of the induction and arc type.

Developed to meet the most rigid requirements, these cements are made up in three different heat-resisting, chemically inactive mixtures — *Alundum* (electrically fused alumina), *Crystolon* (silicon carbide) and electrically fused magnesia.

NORTON COMPANY
WORCESTER, MASSACHUSETTS

NORTON ELECTRIC FURNACE FUSED REFRACTORIES

A Clearfield "930" in a modern Michigan Steel Foundry.

CLEARFIELD
SAND MIXERS

Help meet WAR'S challenge to Industry!

Doing a top-capacity job in the many foundries throughout the country—the Clearfield "930" readily turns out more than a ton a minute of perfectly prepared molding sand in continuous gray iron systems—and proportionately high outputs in steel facing sand preparation.

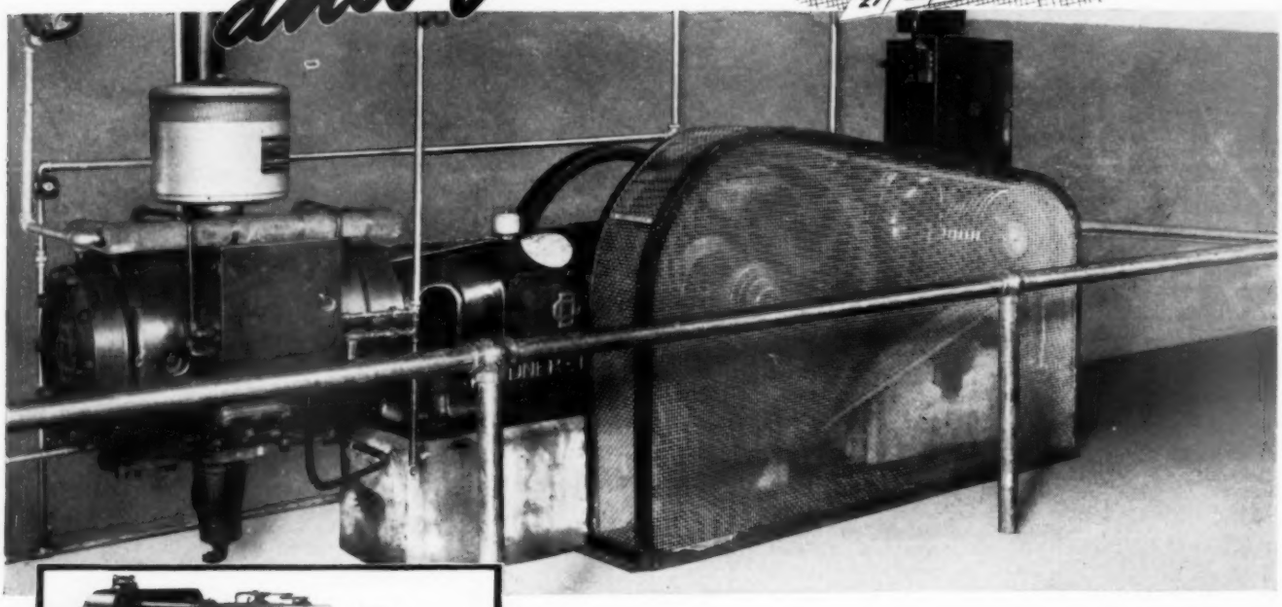
Day in and day out, Clearfield Sand Mixers speed up America's vital foundry production!

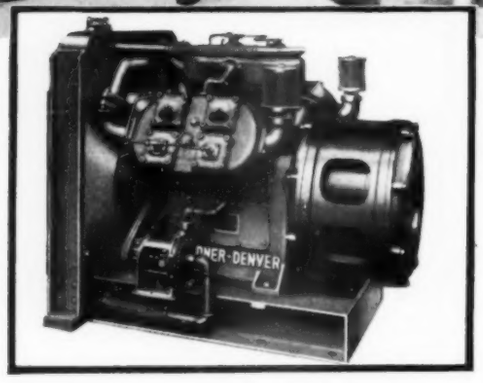
Catalog 75 tells the real story.

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.

For Today 1943 ... and for 194X





For high efficiency air output in small space, Gardner-Denver "WB" Two-Stage Vertical Air Compressors are water-cooled for cooler operation. Furnished with direct motor mounting or with sheave or "V"-belt drive, displacement ranges from 142 to 445 cubic feet per minute.

TODAY'S plans must prov. e for a supply of compressed air that's big enough to do the job—a compressed air source that won't "let down" during emergencies. Tomorrow's plans must assure compressed air at the lowest possible cost—to fit competitive conditions.

Meeting both of these requirements, Gardner-Denver "RX" Single-Stage Horizontal Air Compressors deliver full, dependable air output, yet their horsepower requirements remain unusually low.

HERE ARE SOME OF THE REASONS WHY:

1. Dirt-free construction that keeps all dirt and grit out of the crankcase.
2. "Air-cushioned" Duo-Plate valves that actually become tighter with use.
3. Positive lubrication that forces ample oil to all bearings and moving parts.
4. Balanced construction that assures an exceptionally smooth-running machine.
5. Electro-pneumatic control that automatically fits air output to air needs.
6. Capacities range from 89 to 1292 cubic feet displacement per minute.

For complete information on Gardner-Denver "RX" and "WB" Air Compressors, write Gardner-Denver Company, Quincy, Illinois

GARDNER-DENVER *Since 1859*

Simanal

20% 20% 20%

A FORMULA .. A MODERN DEOXIDIZER

SIMANAL—a homogeneous ferro-alloy of silicon, manganese and aluminum—is notably *more effective* in application than are its constituents used separately—is distinctly outstanding as a deoxidizer, as a controller of grain size and inclusions, and is a factor of value in the production of more uniform steels from heat to heat. (Full information is available.)

Copies of this descriptive folder will be furnished to interested executives upon request.

PHILO · DEPENDABILITY · QUALITY · SERVICE

RAINIER · DEPENDABILITY · QUALITY · SERVICE

Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh Tacoma

LET ME HAVE
HOT
SAND

SAHARA
for
CONVEYING
AND ELEVATING
HOT MATERIALS
OF ALL KINDS

★

Both belts are made of 37½ oz. duck, and all stitching is of the inner-locked type; it WILL NOT "RUN" if a thread is cut or broken. The complete absence of PLY-SEPARATION during the entire life of the belt is one of the many outstanding characteristics of IMPERIAL INNERLOCKED BELTING.

For foundry use: IMPERIAL BELTING is standard equipment in many prominent foundries. Its efficiency for handling sand and castings, hot or cold, is well established. *We carry large stocks of standard sizes ready for immediate shipment.*

CONTAINS NO RUBBER

GIVE ME THE
ROUGH
STUFF

REXALL
for
CONVEYING
AND ELEVATING
COLD SAND,
CASTINGS, ETC.

IMPERIAL BELTING CO.

1750 S. Kilbourn Ave.
CHICAGO, ILLINOIS

HE WILL CONTINUE TO BE

"Always at Your Elbow"

DURING 1943

He's been there year after year . . . always ready to tackle any problem in your foundry . . . whether it concerns selection of the iron, operation of the cupola, pattern making, flask preparation, pouring, cleaning or any other disturbing situation that might prevent production from reaching its highest peak.

Have you taken advantage of his offer to help you? Many foundries have—to their benefit.

He's the Republic Pig Iron Metallurgist. But don't let that word "metallurgist" give you the idea that he's a "text-book specialist." Certainly, he's a highly trained technician. He must be to know all the intricacies of irons and the "how and why" of their performance.

But he's a practical foundryman, too. He has spent years in foundries of every type. He knows where to look for the "bugs" that cause production ailments. He knows the "tricks and short cuts" that are tonic to sluggish output figures.

He's ready to help you. Just ask us to send him.

REPUBLIC STEEL CORPORATION
General Offices: Cleveland, Ohio
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Bldg., New York, N. Y.

Republic

PIG IRON

ALSO TRUSCON FOUNDRY FLASKS • REPUBLIC CORE WIRE • FOUNDRY NAILS

"CHATEAUGAY"
Low-Phosphorus, Copper-Free

"REPUBLIC"
(Northern)
Foundry, Basic and Malleable

"PIONEER"
(Southern)
Foundry and Basic

OK St. Louis-

FOR the first time in its history The American Foundrymen's Association has chosen the great city of St. Louis as the 1943 convention city. That these three days of technical sessions and important meetings will be of outstanding interest to all foundrymen, there is no question as there will be not only the meetings and discussions on foundry practice but in addition an interesting program of meetings dealing with war production and a serious consideration of the part the foundry industry is playing in aiding our nation and the nations of our allies on the road to victory.

The facilities of St. Louis to handle a meeting of this size and importance are well known and the activities of the St. Louis Chapter of the A. F. A. are already well under way to insure the success of these meetings and the accommodation of the many foundrymen who will be in attendance.

THREE IMPORTANT DATES

APRIL 28-29-30, 1943

47th Annual

A. F. A. CONVENTION AND WAR PRODUCTION CONGRESS

THE FOUNDRY

FOR APRIL

THE PRE-CONVENTION ISSUE

This issue of THE FOUNDRY will constitute a complete preview of these important days and will contain information of interest and importance to the entire foundry industry—a complete resume of the program of meetings and an outline of the war production congress which will again this year be held in conjunction with the convention. All this in addition to the regular features to be found in any issue of THE FOUNDRY.

FOR JUNE

THE POST-CONVENTION ISSUE

Of unusual importance this year will be the Post-Convention issue of THE FOUNDRY, reporting the many technical meetings with particular attention to the discussion of the war production effort of the foundry industry. The part cast metals are playing in the war effort of our nation is a very important one and the contents of the June Post-Convention of THE FOUNDRY will be valuable reading for all foundrymen whether they can attend the convention or not.

NOTE: To all manufacturers and suppliers who in any way contact, sell and serve the foundry industry, these two issues of THE FOUNDRY present an invaluable advertising opportunity geared to important changes in foundry practice and at a time when the eyes of the entire industry are turned on the St. Louis convention.

· APRIL 28-29-30 · 1943

MACKLIN
GRINDING WHEELS

There is a MACKLIN wheel for every grinding job. If you are having any grinding difficulty call for a MACKLIN Field Engineer—no obligation.

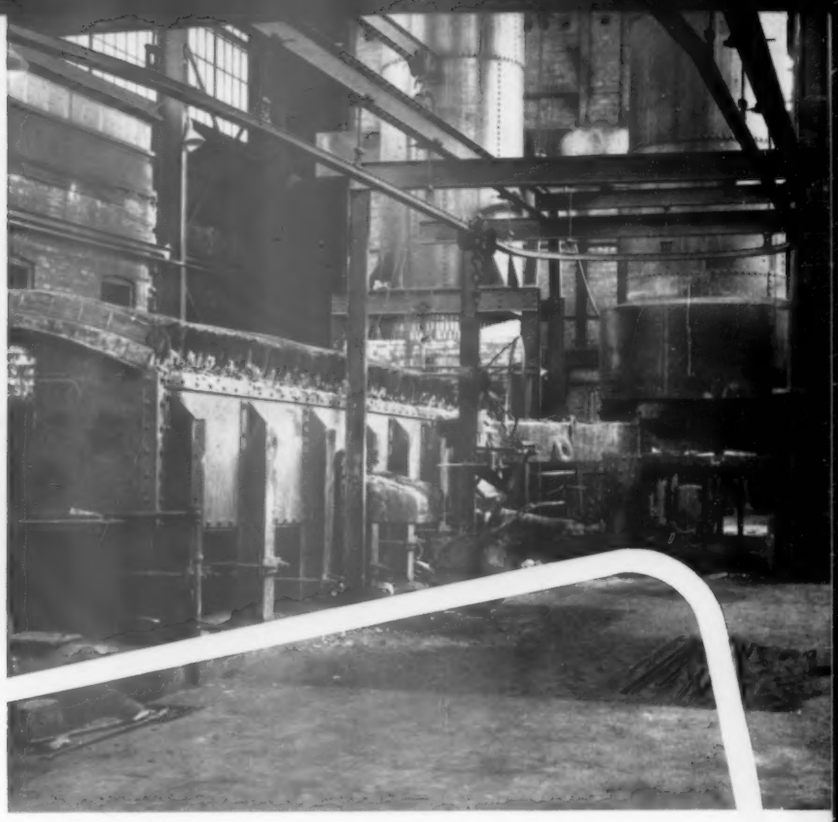
THAT'S MY JOB "PROTECT YOUR PRODUCTION"
THANKS! FOR PUTTING US STRAIGHT ON THAT GRINDING JOB— AND FOR RESPONDING SO QUICKLY TO OUR WIRE FOR ASSISTANCE
MACKLIN FIELD ENGINEER

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia

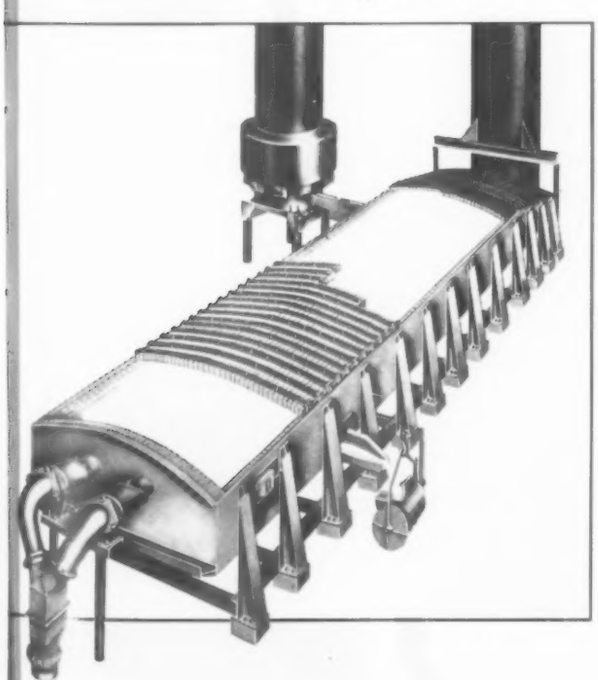


Have you investigated

DUPLEXING?

. . . it speeds up output of high grade metal and reduces costs for many foundries.

The coordination, or duplexing, of different types of melting and refining equipment is enabling foundrymen to get bigger, *faster* production of the high strength grey irons, malleables, and steels needed for war. Experienced Whiting engineers are analyzing individual requirements and supervising installations that provide a continuous supply of hot metal, closer control of quality, economies in fuel and material, and synchronized production. For information write Whiting Corporation, 15607 Lathrop Ave., Harvey, Illinois.



SUITABLE COMBINATIONS of the following units of equipment will employ each unit to best advantage and secure maximum benefits from the installation:

Cupolas
Converters
Electric Furnaces
Open Hearth Furnaces
Reservoir Ladles
Rotary Furnaces
Air Furnaces
Cradle Furnaces

For best results, duplexing should be undertaken with the help of competent engineering counsel.

TYPICAL ARRANGEMENTS for duplexing include such combinations as these:

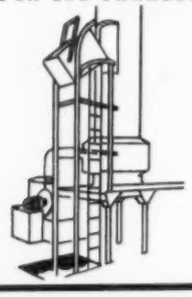
Cupola to Air Furnace
Cupola to Electric Furnace
Cupola to Converter
Cupola to Open Hearth
Air Furnace to Electric Furnace

TRIPLEXING is increasing the output of high quality steels:

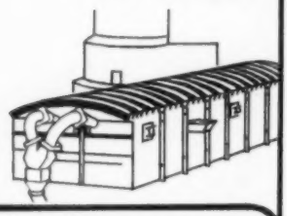
Cupola to Converter to Electric Furnace

WHITING
CORPORATION

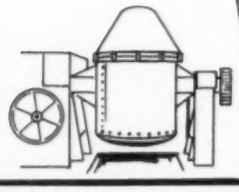
CUPOLA and CHARGER



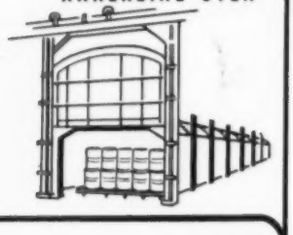
AIR FURNACE



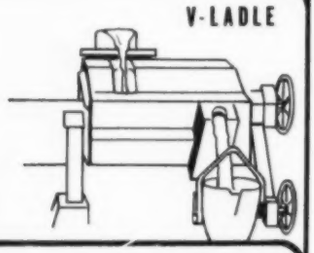
CONVERTER



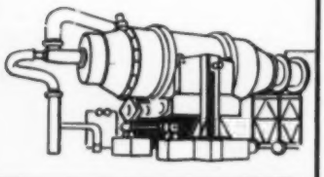
ANNEALING OVEN



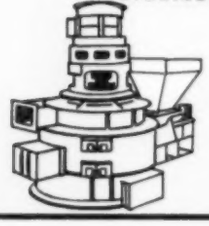
V-LADLE



ROTARY FURNACE



PULVERIZER



WHITING FOUNDRY EQUIPMENT is engineered to the needs of practical Foundry Operation

Whiting has supplied melting equipment for foundries for nearly sixty years. Whiting engineers are practical foundrymen . . . they know from actual experience how equipment should be built to give best results. They have designed Whiting equipment for convenience and safety . . . and in numerous instances their developments have improved processes and reduced costs.

Whether you are in the market for a new ladle or a complete duplexing set-up, it will pay you to investigate Whiting equipment that is "engineered to the job."

You can get what you need

FROM WHITING

CUPOLAS
and accessories including spark arrestors, roof hoods, chain curtains, door props and hoists, blowers, wet spark suppressors, etc.

CONTROL EQUIPMENT
Hot blast—externally fired and Griffin types; moisture control equipment; Foxboro air weight controls.

CHARGING EQUIPMENT
Skip hoists—inclined and vertical; Wishbone chargers in overhung, underslung, horseshoe, monorail, jib, and gantry crane types. Also transfer cars, car pullers, bins, scales, trucks, bucket loaders, loading platforms, and overhead traveling cranes.

CONVERTERS
Side blow converters with auxiliary equipment, including preheaters, gauges, electric eye controls, and service platforms.

AIR FURNACES
Standard, duplexing, cradle, Brackelsberg, etc.

ANNEALING OVENS
fired with pulverized coal, oil, or gas.

PULVERIZERS AND BURNERS
Pulverizers for coal, charcoal, pitch, and other fuels, and miscellaneous grinding. Burners for melting, duplexing, annealing ovens and furnaces; also burners for boilers.

METAL HANDLING
Ladles—hand, shank, trolley, crane, and truck . . . for pouring, mixing, desulphurizing, and use as reservoirs. Also ladle handling equipment, hot metal transfer cars, cranes, hoists, etc.

CLEANING EQUIPMENT
Hydro-Clone dust and fume suppressors, filters, Hydro-Blast barrels, tumblers, sand dryers, mixers, sand drying equipment.

MISCELLANEOUS EQUIPMENT
Crucible shanks, crucible tongs, pick-up tongs, trucks, cars, dump buckets, turntables.

WHITING CORPORATION

Offices in Chicago, Cincinnati, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, St. Louis, Washington. Agents in other principal cities.

CONSERVE ALLOYS by Using "EM" Briquets for Additions of Chromium, Manganese, and Silicon

UNUSUALLY high recoveries are obtained when "EM" Ferro-alloy Briquets are used to add the alloying elements to cast iron in the cupola. With good practice, uniform recoveries are obtained which average 90 per cent of the silicon, 85 per cent of the manganese, and 90 to 95 per cent of the chromium, when these elements are added in the form of "EM" Briquets. The uniformly high recoveries give the foundryman close control over the composition of the iron.

"EM" Briquets are made with a special binding material which has a higher melting point than the ferro-alloys. This binder protects them on the way to the melting zone so that there is no excessive loss through oxidation. In the melting zone the ferro-alloys melt and dissolve in the molten iron in the hearth, and the binder disappears in the slag.

"EM" Briquets are convenient to use because they contain a definite amount—either one or two pounds—of the alloying element, and because they can be identified by their shape. They are handy to use because they eliminate the necessity of breaking lump ferro-alloys to get an exact number of pounds for the alloy addition.

Because of the effective results obtained by adding molten alloys to the iron in the hearth, "EM" Briquets make possible the use of a high percentage of inferior scrap. The close control possible when alloy additions are made with "EM" Briquets results in few rejected castings and great flexibility in cupola operation.

For further information about the use of "EM" Briquets, write for the book, "Briquetted Alloys for the Cast Iron Foundry."

"Electromet" Ferro-Alloys and Metals are distributed through offices of Electro Metallurgical Sales Corporation in Birmingham, Chicago, Cleveland, Detroit, New York, Pittsburgh, and San Francisco. In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario.

Sizes and Shapes of "EM" Briquets

SILICON — "EM" Silicon Briquets are cylindrical. The large and small sizes contain 2 lb. and 1 lb. of silicon respectively.

CHROMIUM — "EM" Chromium Briquets are hexagonal and contain exactly 2 lb. of chromium.

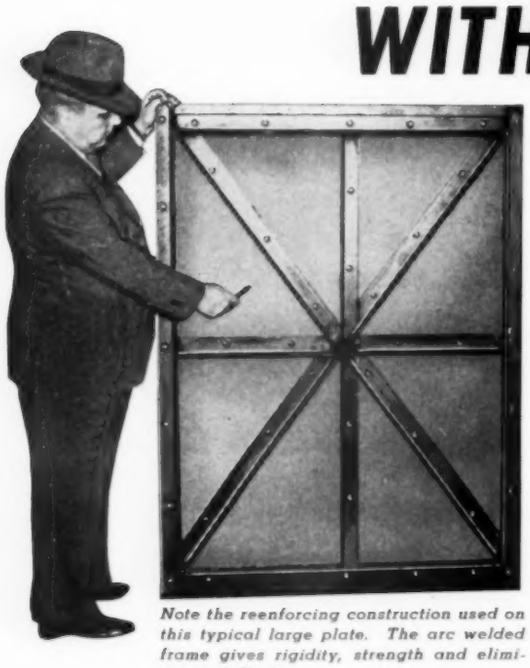
SILICOMANGANESE—"EM" Silicomanganese Briquets can be identified by their square shape. Each contains 2 lb. of manganese and ½ lb. of silicon.

Electromet
Trade Mark
Ferro-Alloys & Metals

ELECTRO METALLURGICAL COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
30 East 42nd Street, New York, N. Y.

"Electromet" and "EM" are registered trade-marks of Electro Metallurgical Company.

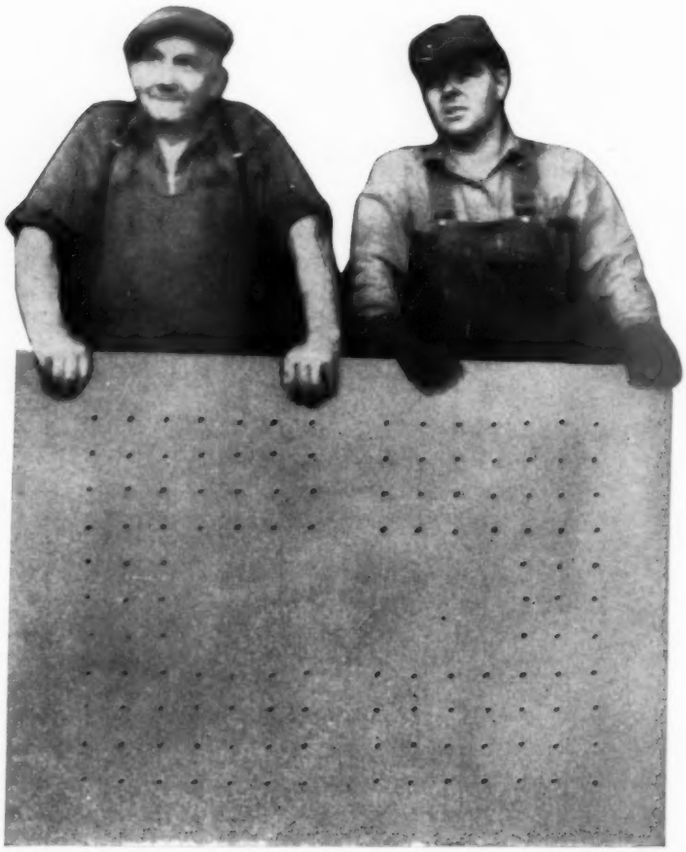
CARRY CORES UP TO 1200 LBS. WITHOUT DEFLECTION!



Note the reenforcing construction used on this typical large plate. The arc welded frame gives rigidity, strength and eliminates deflection.

IT IS BEING DONE ON DIAMOND REENFORCED STEEL CORE PLATES

These special core plates are designed to carry large cores up to 1200 lbs., cores of any size, without deflection or warping.



You may obtain Diamond Core Plates to suit your own special requirements. They are furnished with or without perforations and in all smaller, standard sizes—plain or reenforced as indicated by your needs.

Send us detailed information on your core baking problem and we'll be glad to design a plate to handle the job. Weight of core and dimensions, in particular.

DIAMOND

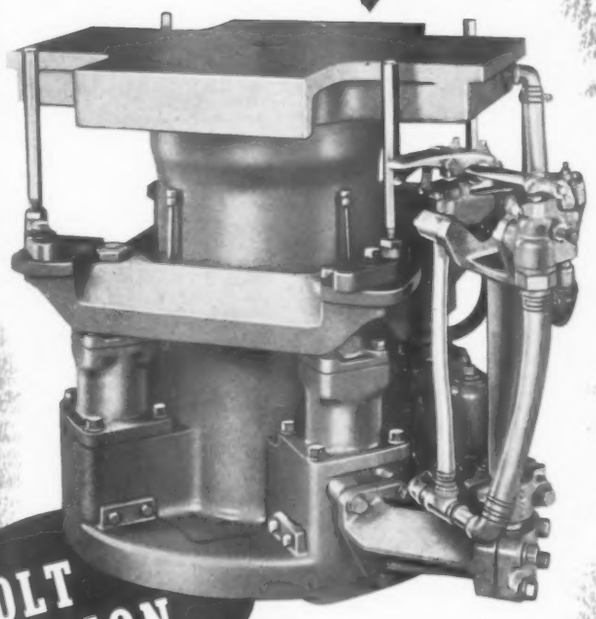
CLAMP AND FLASK COMPANY

Telephone 2553 **Richmond, Indiana**

Designers of* CORE PLATES, JACKETS, BANDS, FLASKS *since 1889

MILWAUKEE JOLT PIN LIFTER

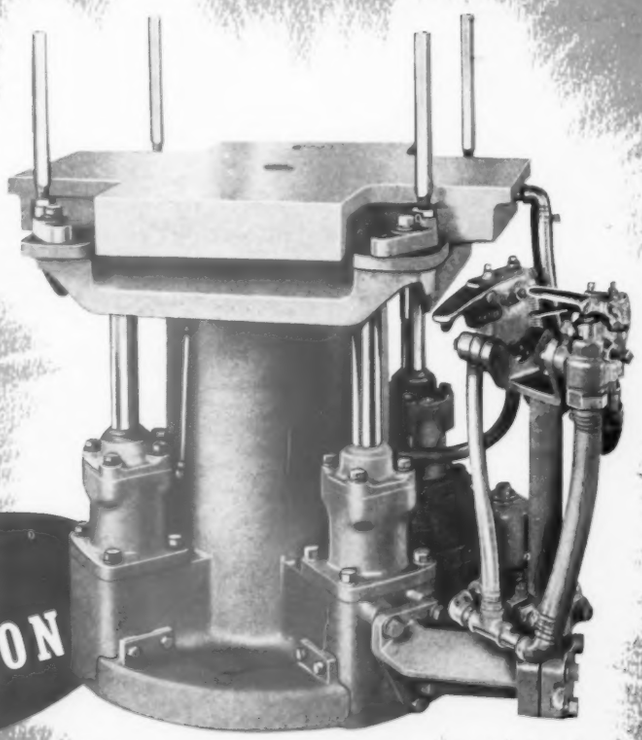
Simple in Design and yet so Versatile!



JOLT POSITION

THE Milwaukee Jolt Pin Lifter is extremely simple in design, with the fewest possible working parts. It is capable of handling a wide range of molding jobs . . . a pattern mounted on any type of board is all that is required, as far as pattern equipment is concerned. The machine has a solid, true jolting action and a precise, controlled pattern draw. It meets the most strenuous foundry requirements.

The lifting frame consists of a rigid, integral member actuated by four equally spaced pistons. Lifting piston rods are hardened and ground, and operate in hardened and ground bushings to guide the draw. Hydraulic power on lifting frame insures smooth draw. The slow draw valve is adjustable for length of draw. Made in all sizes.



DRAW POSITION

MILWAUKEE FOUNDRY EQUIPMENT CO.

3238 WEST PIERCE STREET • Cable Address "MILMOLDCO" • MILWAUKEE, WISCONSIN

Women at War

• This young woman operates 4 Model 80 Automatic Speedmullors. Once the mixing formula and mulling schedule are set, these automatic Speedmullors deliver the exact type of sand required, at the exact time specified. Just a turn of a couple of valves and presto!

Speedmullors

By THE BEARDSLEY & PIPER COMPANY
2541 NORTH KEELER AVENUE CHICAGO, ILLINOIS

Women at War

● This young woman has sacrificed her peacetime ambition to operate a Speedslinger on the home front. After a six-hour training period she was able to handle this mammoth Motive Type Speedslinger to ram molds of all shapes and sizes, from snaps to largest pit molds.

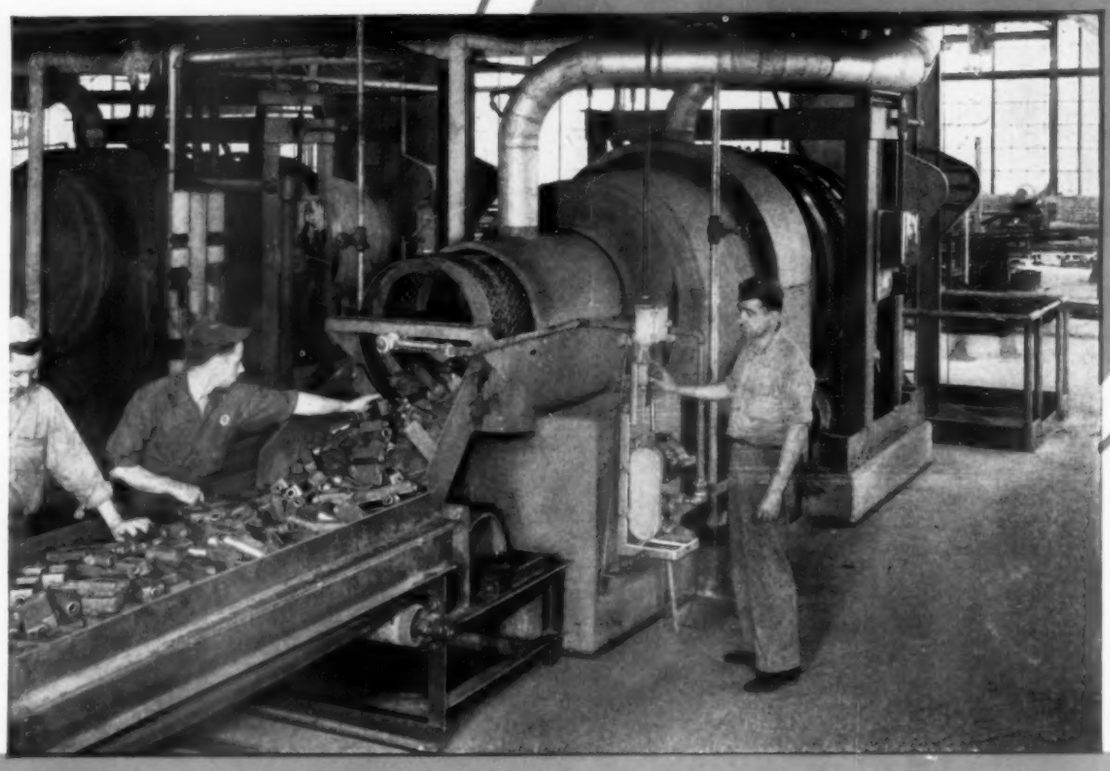
Speedslingers

By THE BEARDSLEY & PIPER COMPANY
2541 NORTH KEELER AVENUE CHICAGO, ILLINOIS

RANSOHOFF *Automatic Star-Return* TUMBLING MILLS

Here's a Vital Statistic!

CLEAN AN AVERAGE OF 37 TONS IN AN 8-HOUR DAY IN EACH MILL



THE RANSOHOFF METHOD

Castings cascade in a mass in which stars are intermingled thoroughly. All voids are filled completely. Stars vary in size and shape. Results: very rapid cleaning without nicking, breaking or excessive wear on mill lining. Stars enter and return automatically. Replacement costs are at minimum. Wet method eliminates dust and dust collectors, reducing health hazards.

speedy . . . gentle . . . automatic handling of stars save time and tumbling costs radically

This shows one of a battery of four RANSOHOFF *Automatic star-return* TUMBLING MILLS; end-loading, end-unloading; 60" x 72". Each mill takes a batch of 30 cu. ft. Castings are cleaned twice. The first cleaning is before sorting and grinding; the final cleaning is after sorting and grinding and cleans the work ready for plating. Mill discharges directly onto inspection conveyor table. Power loader is set in pit below floor level.

Write the RANSOHOFF ENGINEERS to solve your tumbling problems.

N. RANSOHOFF, Inc.

CINCINNATI, OHIO
Township Ave. and Big 4 R. R.

The firm of SWAN-FINCH had its beginning 90 years ago in crude lubricants of that era.

Our 90TH Anniversary

Serving American Industry

Thru four American Wars;—*nine decades* of cumulative research and for the past 30 years specializing in Core Oils.

Today SAFCO Core Oils are helping materially to establish greater production records—devising new ways and means to meet exacting demands for greater speed—INCREASED PRODUCTION!

To be sure of best results SPECIFY

SAFCO CORE OILS

Ask to have our field representative call.

SWAN-FINCH Est 1853

These wings are helping win, too!

SWAN-FINCH OIL CORPORATION

Offices		Plants	
New York City—Executive Offices	R.C.A. Building, West	Newark, N. J.	120 Lister Avenue
Chicago, Ill.	201 North Wells Street	Chicago, Ill.	5849 West 66th Street (Clearing, Ill.)
Detroit, Mich.	2596 Hart Avenue	Detroit, Mich.	2596 Hart Avenue

NEW

AO

Protective Clothing Especially Tailored for Women Welders

Tailored Coat—Note smart cut, shaped sleeves, and tucks running down from shoulders.

Tailored Sleeves and Tailored Apron — Note how Tailored Cap protects hair.

Tailored Overalls—Note how flared trouser legs protect feet.

Women can now obtain welders' leathers that not only offer adequate protection but also fit snugly and comfortably, look smart, and withstand severe use and abuse. Every garment in the new AO line of Tailored Protective Clothing has been styled according to dressmaker patterns. As a result, these leathers permit free and easy movement of the body, enabling women welders to turn out more and better work — with less fatigue. Expert design also adds notably to garment life — especially in the sleeves, at the waistline, and across the shoulders.

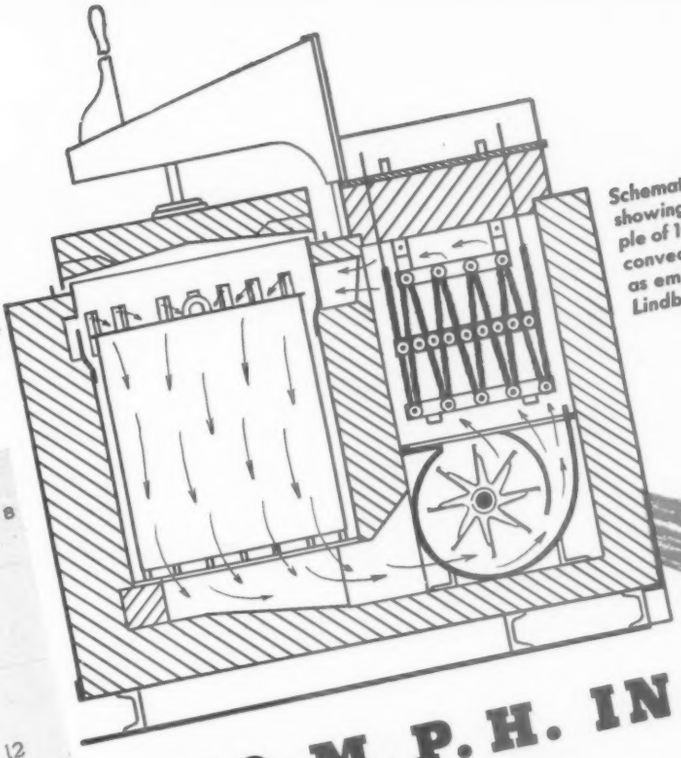
AO Tailored Protective Clothing is made of specially selected chrome tanned cowhide. It is as light in weight as possible, consistent with adequate protection. All garments have a soft suede-like appearance. Included in the line are Tailored Coats, Short Jackets, Overalls, Sleeves, Aprons, and a Cap to protect women's hair and ears during the welding operation. For further details, get in touch with your nearest AO Branch Office.

American Optical

COMPANY

SOUTHBRIDGE, MASSACHUSETTS

CYCLONE



Schematic drawing showing the principle of 100% forced convection heating as employed in the Lindberg Cyclone.

100 M.P.H. IN A 5° GROOVE!

Evidence of accurate heating—a typical Cyclone control chart.

A typical load of aluminum castings which are heat treated daily, and with consistent uniformity, in Lindberg Cyclones all over the country.

STARTING at a cyclonic speed of 100 miles per hour, heated air is driven, by a large, powerful, dynamically balanced fan of Lindberg design, through the charge of the Cyclone Furnace, soaking each piece in an accurate, uniform heat, which is precision controlled to ± 2.5° of the desired temperature.

PIONEERED BY LINDBERG

This 100% forced convection heating principle of the Cyclone Furnace, pioneered and developed 8 years ago by Lindberg engineers, is employed today by all the leading aircraft manufacturers and subcontractors in the country for the precision heat treatment of magnesium and aluminum.

YOUR PRODUCTION SCHEDULE INSURED

Isolation of the work chamber from any damaging radiant heat source plus the accurate temperature control of the voluminous stream of heated air makes the Cyclone the perfect furnace to meet the close heat tolerances demanded by magnesium and aluminum alloys. As a natural result, production is speeded through more rapid and uniform heating and costly spoilage of vital material is eliminated due to the accurate heating control.

The 78 different vertical type sizes and 62 sizes of the box type, allow you a wide range of selection in planning your production schedule. For more detailed information on either the box or vertical type, both gas fired and electrically heated, the appropriate bulletins will be sent on request.

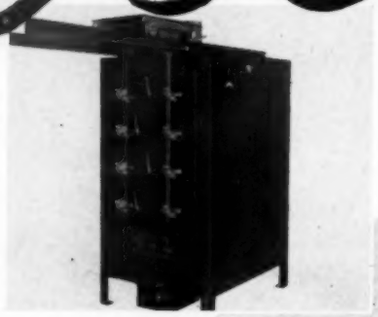
LINDBERG ENGINEERING COMPANY
2453 WEST HUBBARD STREET • CHICAGO

LINDBERG FURNACES

SUPER-CYCLONE FOR HARDENING, NORMALIZING, ANNEALING, TEMPERING
CYCLONE FOR ACCURATE, LOW COST TEMPERING OR NITRIDING
HYDRYZING FOR SCALE FREE AND DECARB FREE HARDENING

7,000 successful

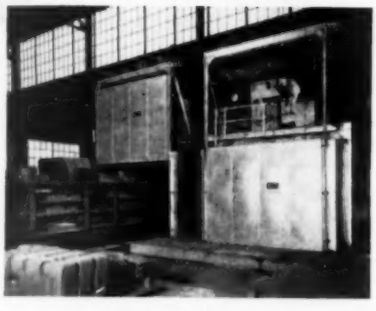
Proof of



COLEMAN
PORTABLE OVENS
for
light production. Built in shelf or rolling drawer types.

COLEMAN
ROLLING DRAWER OVENS
for
speedy baking of small and medium cores.

COLEMAN
TRANSRACK OVENS
for
operation with portable racks. Single or multiple rack capacity.



COLEMAN
CAR TYPE OVENS
for
both core baking and mold drying. No job too large.

The right type and size of Coleman Oven to meet every core baking and mold drying need!

COLEMAN CORE AND MOLD OVENS

THE FOUNDRY EQ
BUILDERS OF COLEMAN IND
CLEVELAND OH

COLEMAN *installations!*

"Know-How"

COLEMAN OVENS offer you the benefit of 37 years of specialization in core-baking and mold-drying problems in every type of foundry production.

This broad experience assures right results the first time -- no second guessing!

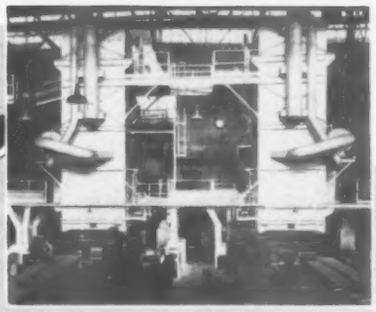
Coleman "know-how" means faster and better core-baking and mold-drying.

Coleman "know-how" saves fuel -- of outstanding importance in our present crisis. Coleman Ovens are built for operation with whichever fuel is most economically available in your district.

Coleman "know-how" provides the most extensive line of foundry ovens built -- your assurance of the right type for your particular job.

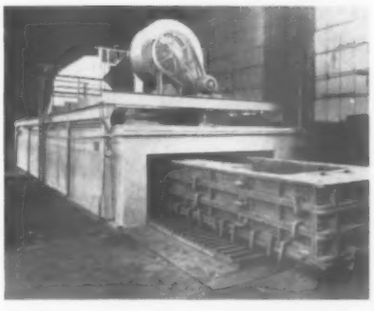
Coleman "know-how" assures complete guaranteed service with undivided responsibility -- from design to operation.

Write for Folio of Bulletins.

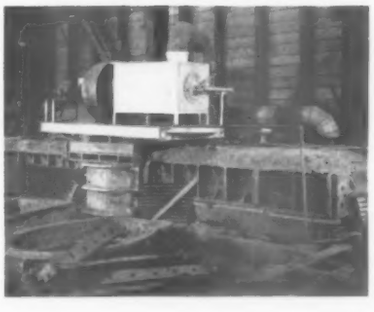


COLEMAN
TOWER OVENS
for
high speed production. Amazing savings in floor space and production costs.

COLEMAN
HORIZONTAL CORE OVENS
for
large scale specialized core production.



COLEMAN
CONTINUOUS MOLD OVENS
for
high speed drying of molds for production demands.



COLEMAN
PORTABLE MOLD DRYERS
for
drying interior of heavy molds.

Y EQUIPMENT CO.
MAN AND SWARTWOUT OVENS
ND OHIO, U.S.A.

COLEMAN CORE AND MOLD OVENS

BETTER CASTINGS

with

MAHR

ENGINEERS • DESIGNERS • MANUFACTURERS
ALL EQUIPMENT FOR METAL HEATING

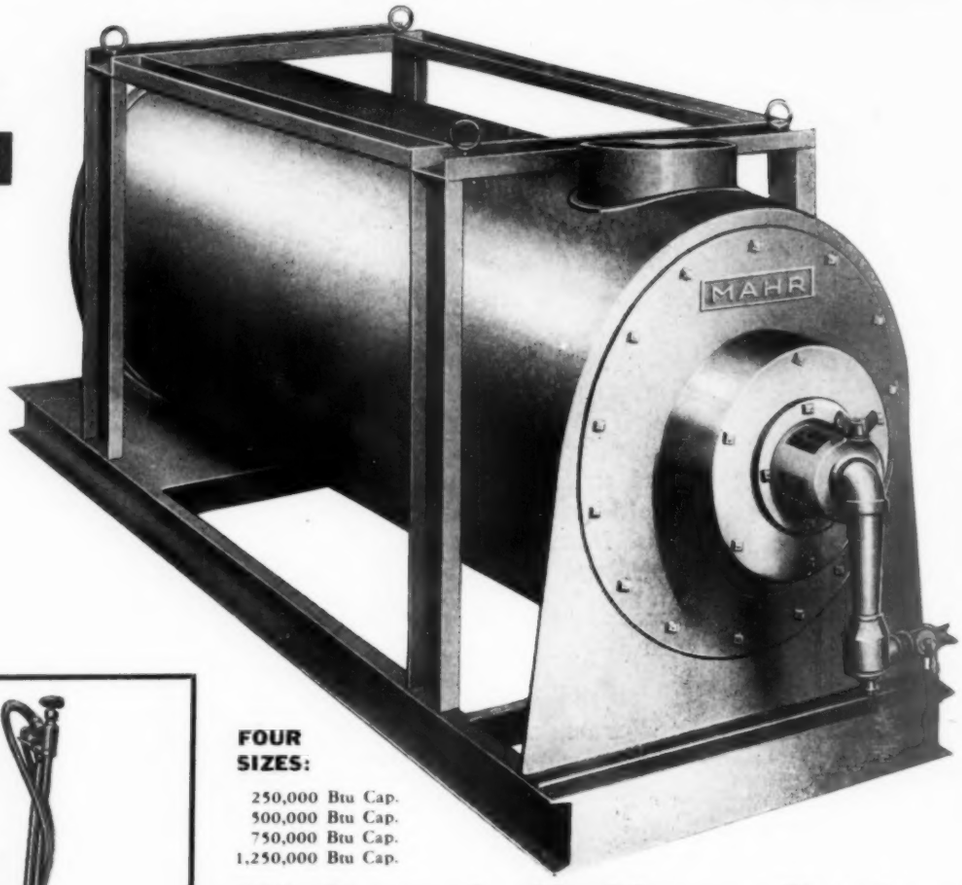
portable

MOLD DRYER

FAST HEAT-UP
QUICK DRYING

OIL OR GAS FIRED

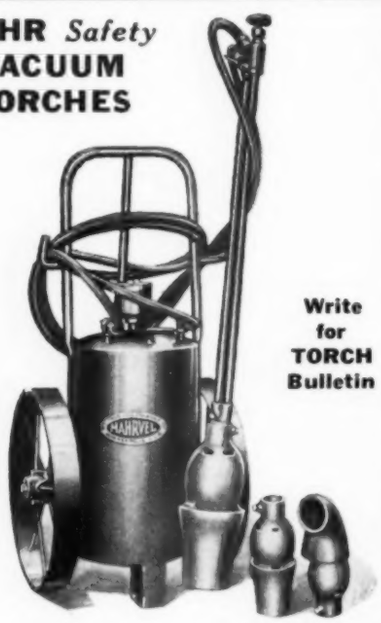
HEAVY STEEL
CONSTRUCTION



FOUR SIZES:

250,000 Btu Cap.
500,000 Btu Cap.
750,000 Btu Cap.
1,250,000 Btu Cap.

MAHR *Safety* VACUUM TORCHES



Write for TORCH Bulletin

Used extensively in foundries, railway shops, etc. wherever intense heat is needed. Throws long, hot flame. Burns kerosene. Lights instantly without pre-heating. It's safe!

MAHR JIFFY TORCH

Produces steady, intense flame to 5 feet. Lights instantly — no pre-heating. Operates from compressed air line at 30 lbs. or more. 2 sizes.

Hi-Speed, Uniform Drying

Large, cumbersome molds are difficult to handle in drying, yet proper and quick drying is one of the most important elements in producing a good casting. After long and exhaustive study and tests of many drying methods in our own and other foundries, we are proud to announce this newest member of an old family.

Designed by an organization long experienced in industrial heat application, and thoroughly tested under everyday foundry conditions with outstanding performance results. Heat-up time is extremely fast. Large volumes of hot gases are forced into every part of the mold for fast, complete drying. Normal drying times are shortened.

With contracts for many very large castings today, several foundries are already using batteries of these dryers with a great saving in time and costs.

The entire unit is mounted on a heavy channel steel frame, and can be quickly moved and set up for use on any large mold. Fuel may be either gas or oil. Economy in operation is one of its features because of rapid and complete combustion.

FOR OVER A QUARTER CENTURY, the name MAHR has been associated with industrial heat equipment of quality and the most modern design. These products include CORE AND MOLD OVENS, FURNACES OF ALL SIZES AND TYPES FOR ANNEALING, STRESS RELIEF, ETC., FORGES, TORCHES, BURNERS, BLOWERS AND VALVES.

Write, Wire, or Phone for Bulletin and Prices

Get our fully illustrated and descriptive bulletin telling all about this dryer. It can be used nearly every day in any foundry. Write, wire or phone TODAY for complete information.

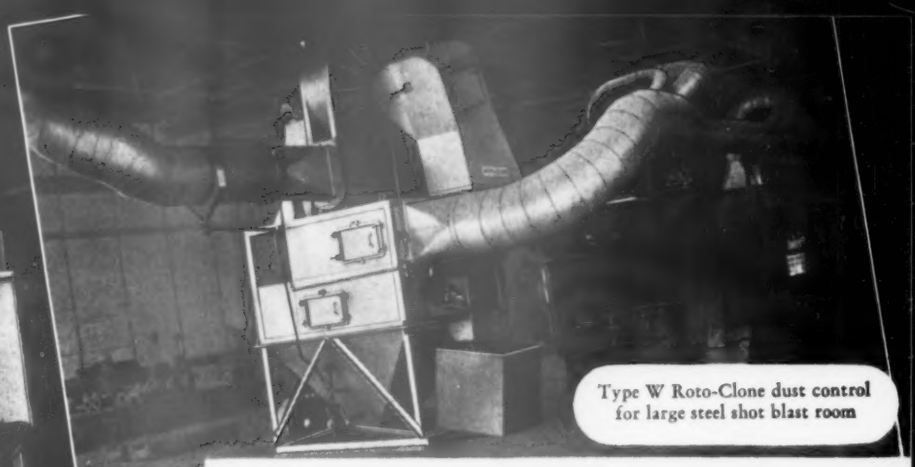
Sales Offices in Principal Cities

MAHR MANUFACTURING CO.

DIVISION OF DIAMOND IRON WORKS, INC.

1709 NORTH SECOND STREET • MINNEAPOLIS, MINNESOTA, U. S. A.

Roto-Clone in combination with AAF filters through which cleaned air is returned to work room

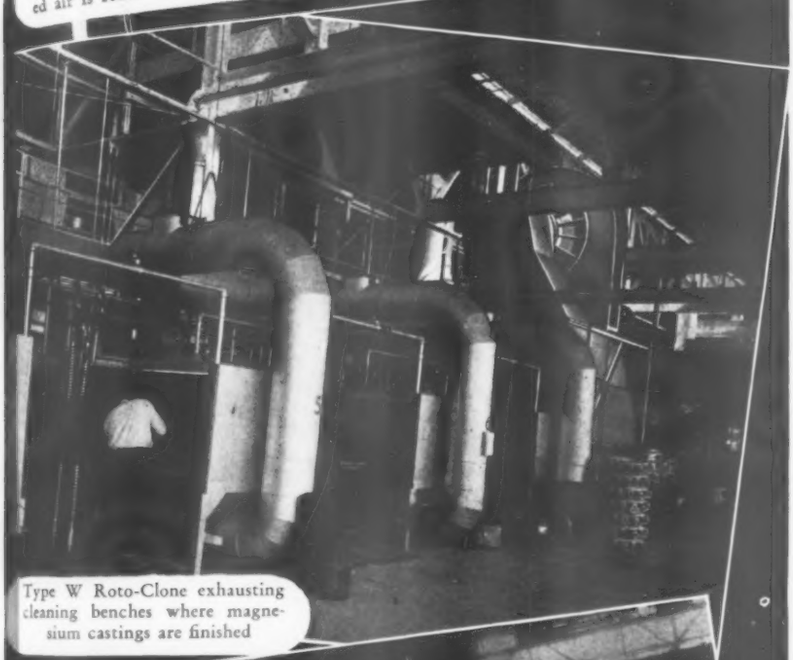


Type W Roto-Clone dust control for large steel shot blast room

Clean Air is a war production necessity

In foundry and manufacturing plants throughout the Nation geared to War Production, American Air Filter Company dust units are speeding delivery to our Armed Forces. Our output today is 100% for war industries where delivery schedules must be maintained and where protection of men and machines against dust has become a definite problem of production planning.

The advantages which Roto-Clone offers in the control of foundry dusts are unique. Its compact design and adaptability to overhead installation are features of outstanding importance under the present overtaxed production conditions. Bulletins describing Roto-Clone's operation and application to all foundry dust problems will be sent without obligation. Write us!



Type W Roto-Clone exhausting cleaning benches where magnesium castings are finished

This Type W Roto-Clone exhausts tumbling barrels at night, sand blast room during day

Roto-Clone grinding bench with Airmat P-L after cleaner for finishing airplane propellers

AMERICAN AAF AIR FILTERS

AMERICAN AIR FILTER COMPANY, INC., 266 CENTRAL AVE, LOUISVILLE, KY.

INCORPORATED

IN CANADA, DARLING BROTHERS, LIMITED, MONTREAL, P. Q.

CLEAN CASTINGS
INCREASE PRODUCTION

TAM FOUNDRY ZIRCONITE SAND YIELDS SMOOTH CASTINGS AND REDUCES CLEANING TIME

TAM Foundry Zirconite Sand used for the entire mold or as a facing sand resists the burning in of the metal and makes possible the production of clean castings and the expansion of output by reducing time in the cleaning department.

TAM Foundry Zirconite Sand does not warp, requires minimum venting and the faster chilling permits better metal distribution into heavy sections and reduces "hot tears"! Four important factors.

TAM Foundry Zirconite Sand is available in three grades, Zirconite Sand A has an approximate melting point of 3812° F. Zirconite Sands B and C 3650° F.

Full particulars on the proper applications of Foundry Zirconite Sands will be sent immediately upon request. Write:

TITANIUM
ALLOY MANUFACTURING COMPANY

TAM Foundry Zirconite Sand "A" was used in the core for the chrome steel impeller wheel illustrated. Note the clean, smooth surfaces.

TAM ZIRCONIUM AND TITANIUM PRODUCTS
Registered U. S. Pat. Off.

GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY

Representatives for the Pacific Coast . . . BALFOUR, GUTHRIE & CO., San Francisco, Los Angeles, Portland, Seattle, Tacoma
Representatives for Canada . RAILWAY & POWER ENG. CORP., Ltd., Toronto, Montreal, Hamilton, Winnipeg, Vancouver, Sydney
Representatives for Europe . . . . . T. ROWLANDS & CO., Ltd., 23-27 Broomhall St., Sheffield, England

BIG-HUSKY-ACCURATE *is not enough!*

You've got to consider the "X" factor, too!

Sure, we make scales big, husky, and accurate. You've got a right to expect *that* from *any* good scale. But we at Fairbanks-Morse build something else into our weighing machines. We consider in the *design* of our scales—*the* "X" *factor!*

The "X" factor is composed of those things which cause inaccurate weighing, *not by the scale,* but by the men who use scales. In other words, the "X" factor in weighing is the *human* liability of inaccuracy.

Having designed and manufactured weighing equipment longer than anybody else in the world, it is only natural that we should know more about the causes of inaccuracy due to the "X" factor.

Consequently, you will find in our scales many little features, such as a pointer which rides *close* to the dial to avoid parallax, and numerals that have been selected for greatest readability. And if you want to completely eliminate the "X" factor, we'll provide a ticket printer which prints an indelible record, automatically.

If you have a weighing problem, or want to speed up your weighing operations, come where there is more experience. Ask Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago.

Fairbanks-Morse Scale Engineers, because they are industrial specialists, can be of greatest service in fitting weighing machinery into your production flow. For weighing while in motion, secrecy in weighing, or automatic operation, ask for their counsel.

FAIRBANKS-MORSE

DIESEL ENGINES
PUMPS
ELECTRICAL MACHINERY
SCALES
MOTORS

WATER SYSTEMS
FARM EQUIPMENT
STOKERS
AIR CONDITIONERS
RAILROAD EQUIPMENT

FAIRBANKS SCALES

Scales

The UNI-WASH Dust Collector

RECIRCULATES WATER WITHOUT PUMP

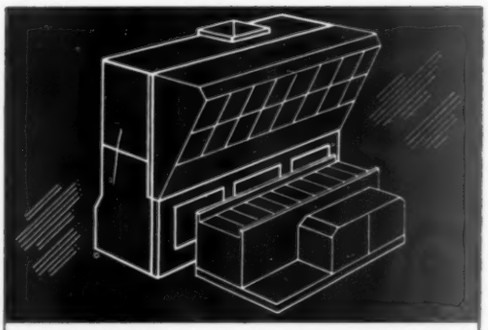
•

FAN IS ONLY MOVING PART

In the operation of a Newcomb-Detroit Uni-Wash Dust Collector, the dust-laden air is drawn through the air inlet and through a vertical curtain of water created between the surface of the water and a suction cone. The air then passes through a turbulent water curtain moving horizontally from a baffle plate located at the top of the cone. Thus the air is washed by two curtains of water before it reaches upper baffles where the last vestiges of entrained water are removed

The basis of this entire process is the suction produced by the exhaust fan—the only moving part. The fan is driven—in most cases with direct connection—by one standard motor. Of particular importance is the fact that no pump is employed. Yet the water is continually recirculated. It is only necessary to replenish the water to compensate for evaporation and when the unit is cleaned.

Because of its simplicity of operation, the Uni-Wash is unequalled for low operating and maintenance costs. Hundreds of these units now in use testify to its high cleaning efficiency—and especially when used with magnesium dust. They are shipped complete, ready for easy, immediate installation. Write for full details.



EFFECTIVE FOR INDUSTRY'S

Toughest

DUST COLLECTING JOB

The dust created by foundry shake-outs has always presented one of the greatest problems in dust elimination. Uni-Wash Dust Collectors, designed as single units complete with fan, motor and intake hood are being installed directly adjacent to the shake-outs in a number of the country's largest foundries. The fact that they prove exceptionally effective for this purpose is definite indication that they will meet every requirement under almost any condition.

NEWCOMB-DETROIT COMPANY, INC.

5751 RUSSELL STREET *Established 1912* **DETROIT, MICHIGAN**

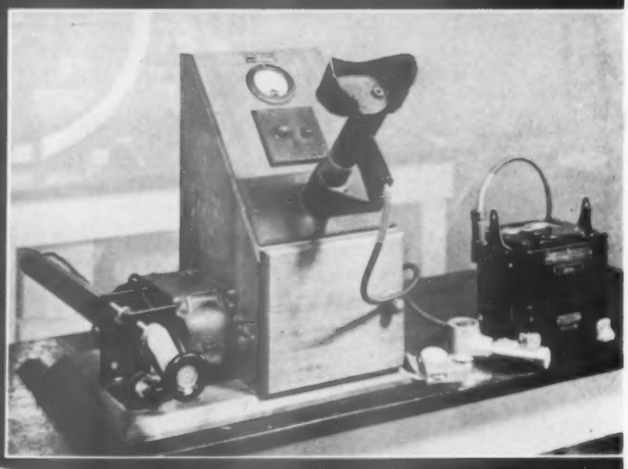
Dust Collectors • Paint Spray Booths • Drying Ovens • Metal Parts Washers and Rust Proofing Systems • Exhaust and Ventilating Systems • Carburizing Systems • Other Sheet Metal Equipment

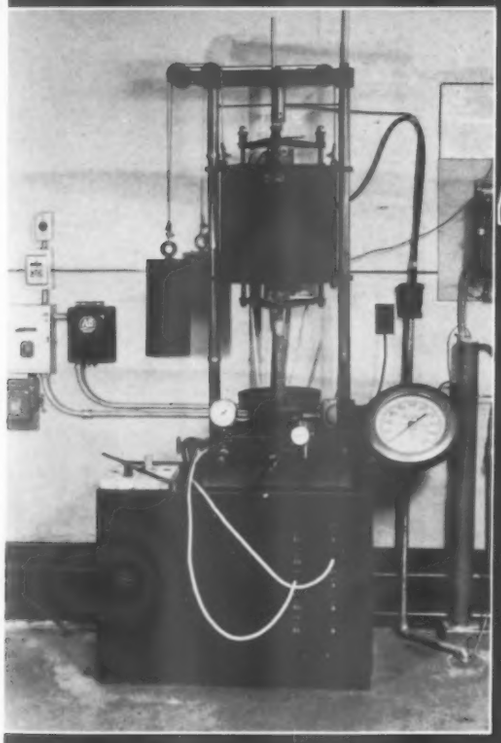
WHAT IS BEHIND THE NAME DELTA FOUNDRY PRODUCTS?

A complete laboratory, separate and apart from other analytical and research facilities, devoted exclusively to analyses and research of CORE and MOLD MAKING problems and practices.

The name DELTA is more than a trade name; it is your unqualified guarantee that every DELTA product is uniform in quality and has been tested and PROVEN in actual practice before being submitted to you.

And DELTA has the facilities necessary to conduct extensive research into the most intricate CORE and MOLD MAKING PROBLEMS.





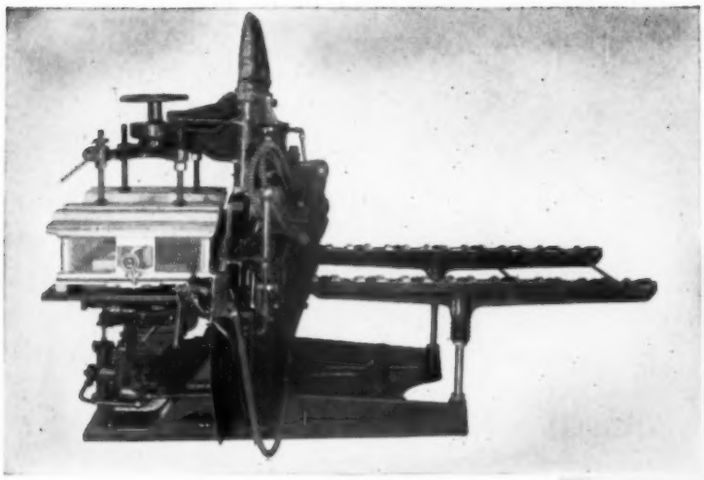
DELTA PRODUCTS FOR THE FOUNDRY

Delta Core & Mold Washes
Delta Grakoat
Delta Non-Ferruskoat
Delta Partex (Nut Shell Parting)
Delta Spray Binders
Delta No-Vein Compound
Delta Core Oils

DELTA OIL PRODUCTS CO.

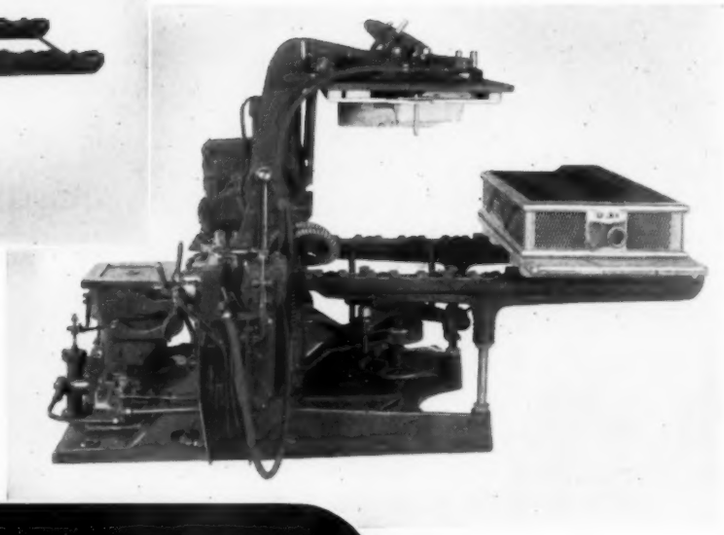
MANUFACTURERS OF INDUSTRIAL & AUTOMOTIVE OILS, GREASES & COMPOUNDS

MILWAUKEE • WISCONSIN



Above—View of No. 815 Jolt, Roll-Over Pattern Draw Machine Clamped, Equalized, and ready for Roll-Over Operation.

At Right—View of same Machine after Rolling Over, Showing Perfect Pattern Draw.



A FAST HIGH PRODUCTION JOLT, ROLL-OVER PATTERN DRAW MACHINE FURNISHED IN THREE SIZES

• Johnston-Jennings Jolt Roll-Over Pattern Draw Machines meet every requirement for fast, easy, efficient work. They assure maximum production even with relatively unskilled operators,—and are standard equipment in most large aluminum and magnesium foundries. These machines are built in three sizes and require no pits. They are of open end construction and incorporate many design and operating refinements much appreciated by practical operating men. Our fully descriptive catalog giving complete details of this and other Johnston & Jennings molding machines furnished gladly on request — No obligation — Send for a copy today.

A COMPLETE LINE PROVEN IN SERVICE INCLUDING—

PLAIN AIR JOLTS
in 12 different sizes

JOLT SQUEEZERS
fast sturdy machines—3 sizes

JOLT STRIPPING PLATES
4 sizes ranging up to 16″ draw

JOLT, SQUEEZE, STRIPPING PLATE AND PATTERN DRAWS
Popular for medium service —2 sizes

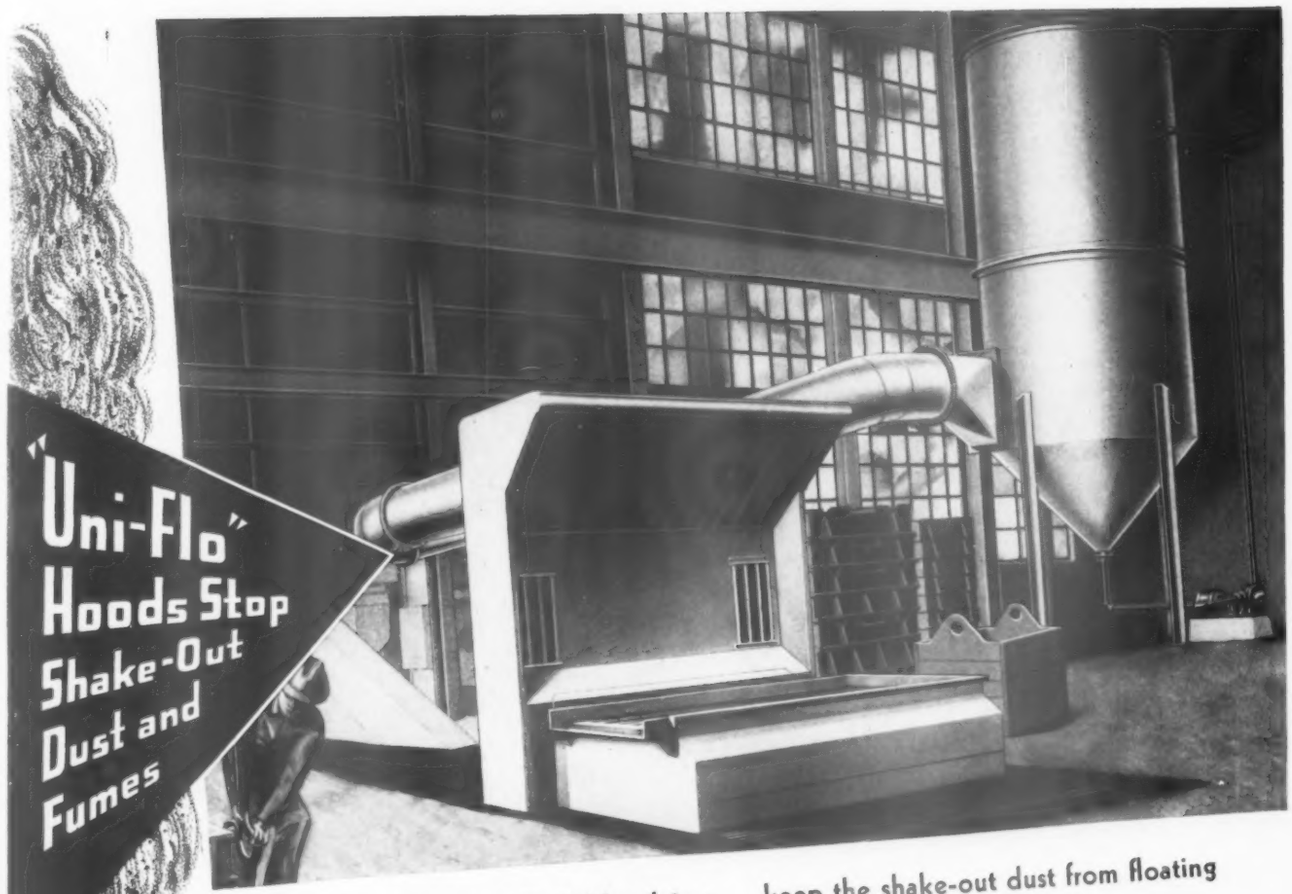
PORTABLE JOLT ROLL-OVER AND PATTERN DRAW
A heavy duty thoroughly dependable machine—portable

JOLT ROLL-OVER AND PATTERN DRAWS
Fast large capacity machines with roll-out conveyors—4 sizes

Write for fully descriptive catalog giving complete specifications.

THE JOHNSTON & JENNINGS CO.

867 ADDISON ROAD • CLEVELAND, OHIO



"Uni-Flo" Hoods Stop Shake-Out Dust and Fumes

The Schneible "Uni-Flo" Hood is a modern adaptation of the venturi principle of air control that is ideally applied to the collection of shake-out dust and fumes. Its design combines in a simple, effective arrangement the known factors of air flow and air control to effect uniform velocity over a ventilated area and with low resistance. By the use of adjustable multiple venturi louvers on the hood face, dust and fumes created at the shake-out can be readily collected with a minimum of air volume for disposal in the dust collector system.

"Uni-Flo" Hoods can be made in any desired size. They are easy to install —allow ample clearance for crane slings, create no eddy currents and keep the shake-out dust from floating into the foundry.

Ruggedly constructed to withstand the most abusive foundry service, they have the same inbuilt dependability characteristics common to all Schneible Dust Control Equipments.

An ever-growing list of users attests to the satisfactory operation of these time-tested shake-out dust control units.

"Uni-Flo" Hoods are available for foundries of every kind and size, and for use with dust collectors of every type or c.f.m. capacity.

Write for a copy of new Bulletin 143, Schneible "Uni-Flo" Dust and Fume Hoods. Send for your copy today.

CLAUDE B. SCHNEIBLE COMPANY
3953 Lawrence Ave., Chicago
Engineering Representatives in Principal Cities

Put Your Dust (gold) in U. S. War Savings Bonds

SCHNEIBLE

DUST AND FUME CONTROL EQUIPMENT

For Faster and Better Results on Aluminum and Magnesium Castings

SEND for a sample of VELSICOL "V-45-D" and see for yourself why there has been such rapid change lately from conventional type core oils. You'll find it particularly well suited to the special problems of aluminum and magnesium casting. Other VELSICOL oils have long been favored and widely used for gray iron and steel casting

VELSICOL

Petroleum Resin Modified CORE OILS

America's Foremost Manufacturer
★ of Petroleum Resins ★

VELSICOL CORPORATION

General Offices: 120 E. PEARSON ST., CHICAGO, ILL.

We All Agree . .

INEFFICIENT VIBRATORS ARE *Too Darned Expensive!*"

ALL TOGETHER: "This year, into the scrap pile they all go. A good, new vibrator costs so little that we can't take a chance on worn ones. As scrap, they're a wee bit of an asset. On the molding floor they're all liability. We can't afford to lose molds that way."

Superintendent: "I know what I'm talking about. We kept a careful record long enough to prove that trying to restore old vibrators is a losing policy. At best, repaired vibrators are an uncertain quantity. Using them lowers our molder's output. And we can't waste a good maintenance man's time by making him tinker with poor vibrators."

Molder: "I'm making out pretty well here. The boss supplies me with new vibrators and expects me to turn out a lot of accurate molds. That's fair enough. I can show him plenty of speed when my molds come out clean and tears don't cut my production. I never can depend on a repaired vibrator. It may stick and ruin a mold any time."

Maintenance Man: "The boss counts on me to keep our equipment running at capacity. That's a big job in itself, and today it's more important than ever before. I've got all I can do without having to give first aid to a flock of broken-down vibrators. I never yet fixed an old one without being afraid that it might let go any minute."

★ ★ ★

DO IT FAST, DO IT RIGHT, WITH SPO MOLDING MACHINES

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

7500 GRAND DIVISION AVENUE • • CLEVELAND, OHIO

Adams Cherry Slip Flasks—A

The Ideal Combinatioro

When you buy an Adams Cherry Slip Flask, you not only get a combination of the finest materials and expert workmanship, but you also get a custom-built job to your exact specifications.

Close-grained cherry lumber, thoroughly air dried, is used exclusively, and all corners are machine locked.

Pins to suit your preference—wide-V, double-V, round, double round or special types, accurately machined on bearing surfaces.

The sand strip mechanism is convenient and quick-acting, and it will stand up under the jolting and squeezing of power machines.

Our facilities have kept pace with increased demand, and we can give your requirements prompt attention.

THE ADAMS COMPA

MOLDING MACHINES · FLASKE

s—Adams Cast Iron Jackets

iorom Every Standpoint

Used in combination with the Adams Cherry Slip Flask or the Adams Cherry Snap Flask, these jackets form a combination that cannot be excelled for convenience and for economical production.

Great strength and rigidity with minimum weight are assured by the combination of horizontal and vertical corrugations. Inner surfaces are accurately surface ground, and assembly is made on a fixture to exact size and to assure correct taper in the case of tapered jackets.

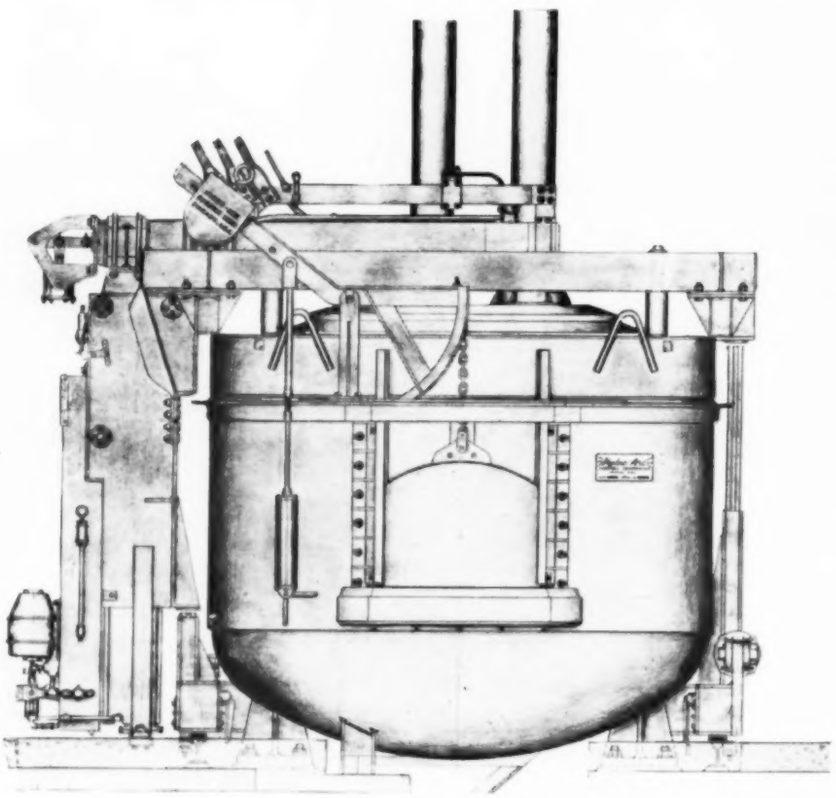
If you prefer steel jackets, we have them also. Regardless of your preference, specify Adams Jackets for proper mold protection.

PAY · DUBUQUE, IOWA · U.S.A.

KEQUIPMENT Established 1883

The **HYDRO-ARC** *Electric Furnace has*

Power Operated Electrode Clamps



The Electrodes are slipped from the floor. Men are not required to get on top of the furnace

This is only one of several advanced features of the Hydro-Arc Electric Melting Furnace. It has a record of especially low operating costs . . . it has low carbon pick up . . . . low electrode and power usage.

Low inertia counterbalancing and small reversing pump motors (which do not surge above their full current rating) result in (1) highest electrode speeds on automatic control, (2) most accurate positioning. The electrodes start and stop instantly in cooperation with the new automatic controls. There is less surging . . . . improved power factor and less transformer heating.

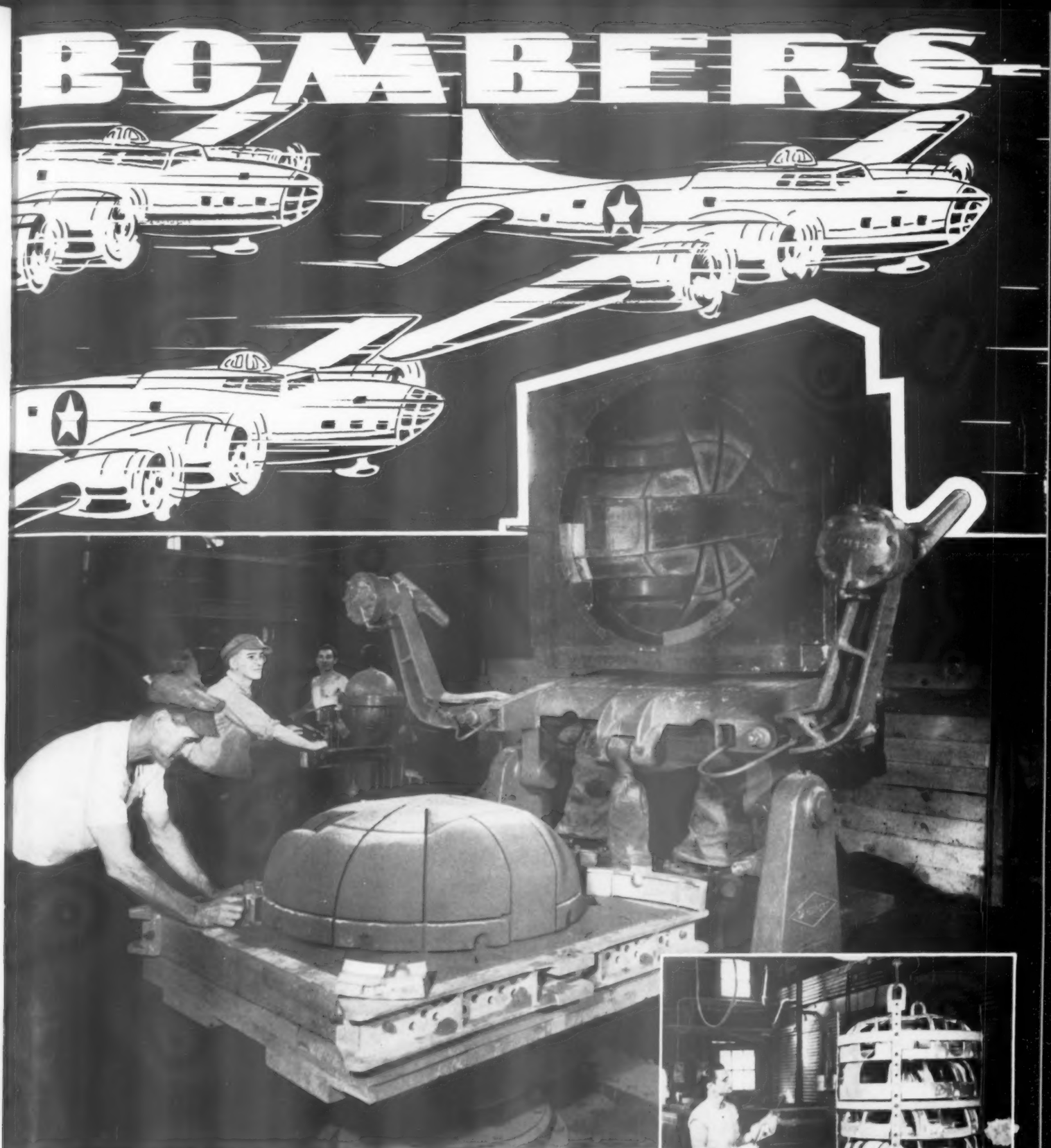
Write for more information about what has been called "The most important development in electric furnaces in the past twenty years".

HYDRO-ARC

FURNACE CORPORATION
561 HILLGROVE AVENUE, LA GRANGE, ILL.
(A suburb of Chicago, Ill., U. S. A.)
Telephones: La Grange 4545 and 4546
Chicago Line: Enterprise 1068

Associated with Whiting Corporation

BOMBERS



he Blackhawk Foundry and Machine Company a "Davenport" molding machine, Model 40SA Rollover makes a perfect mold for an a'uminum turret top for bombers.

Heat treating the cast aluminum turret tops.

N THE SKY TO SLAP THE JAPS

ting machines in the air, on the land and in the sea;—the foundries of America are furnishing parts of these hard-hitting war implements.

"DAVENPORT" modern molding machines are working day and night, making faster and er molds and cores in hundreds of the leading foundries, pouring steel, malleable and gray also magnesium and other nonferrous metals.

Let us check over your present equipment and see if we can increase your production.

Send for our complete catalog

AVENPORT MACHINE & FOUNDRY CO.

VENPORT IOWA, U. S. A.

"DAVENPORT" Line of Molding Machines

JOLT ROLLOVER DRAW MACHINE
Model SA (Seven sizes)—Capacity from 750 to 12,000 lbs.
Model A (Six sizes)—Capacity from 1,000 to 12,000 lbs.

JOLT STRIPPER OR PUSH-OFF MACHINES WITH ADJUSTABLE LIFT PINS
Six Sizes—Capacity from 1,000 to 10,000 lbs.

PLAIN JOLT MACHINES
Fourteen sizes—Capacity from 200 to 25,000 lbs.

for Victory!

FANNER SUPERCHILLS

(Patented)

No small part in the Victory program has fallen to Fanner Superchills.

When foundry production has been doubled and tripled to overcome the possibility of there being "too little too late"—when production minutes and methods count as they never did before—*when even the loss of a single casting for want of proper cooling* seriously effects the speed of the all-out effort . . . Fanner Superchills take on the importance of an absolute "must" wherever castings are made.

Our engineering staff is at your service at all times in helping you make better castings faster and more economically through the use of the proper Fanner Superchills, Chills and Chaplets.

THE FANNER MANUFACTURING CO.

Brookside Park, Cleveland, Ohio • Canadian Fanner, Ltd. Hamilton, Ontario

Geared for Speed

in the production of

INDUSTRIAL RADIOGRAPHS

CLEARMIX
INDUSTRIAL
X-RAY DEVELOPER

PERFIX
INDUSTRIAL
X-RAY FIXER

We have learned through countless laboratory tests of our own and competitive products that one type of developer and fixer would not serve *two* types of x-ray film—namely, *industrial* and medical.

The emulsion employed in the manufacture of industrial x-ray films is different from that used for medical films.

Picker Clearmix *Industrial* Developer and Perfix *Industrial* Fixer are *specific* formulas . . . and will produce the finest results obtainable in terms of speed, clearness, contrast and detail.

When reordering concentrated x-ray solutions, insist upon Clearmix Developer and Perfix Fixer and you will see the difference in processing results!

PICKER X-RAY PX CORPORATION

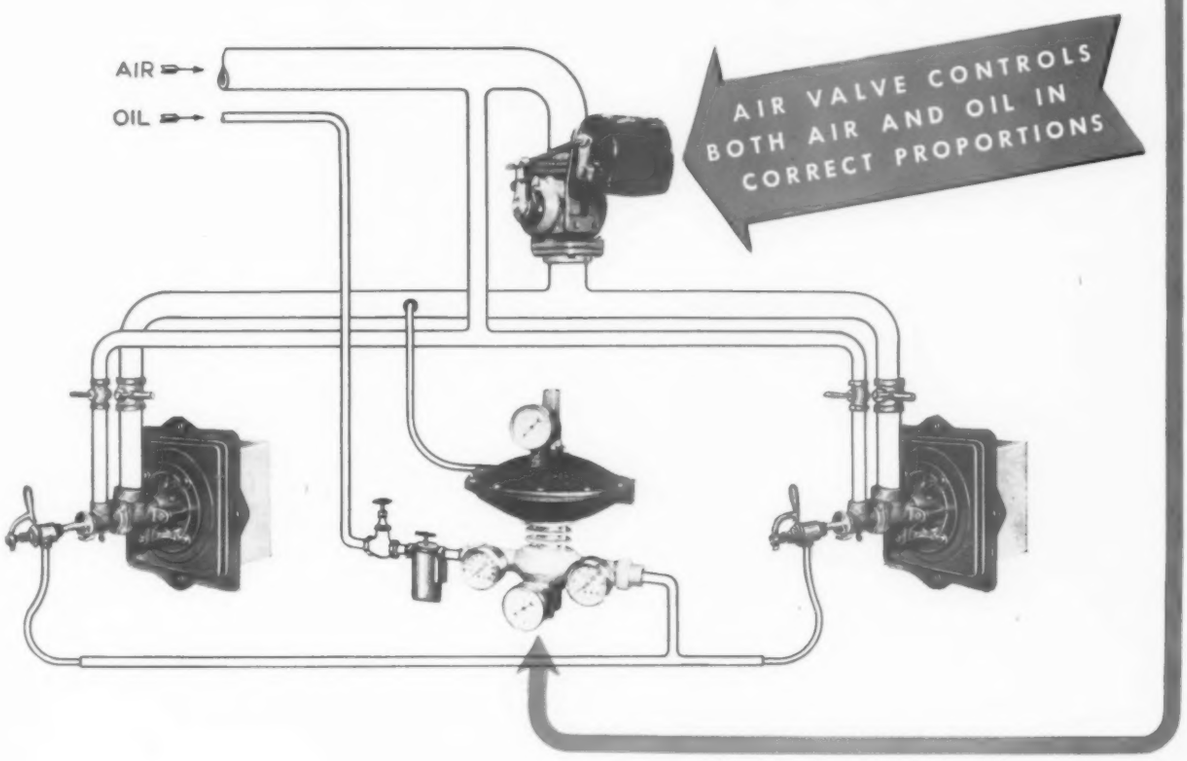
300 FOURTH AVENUE, N. Y. OFFICES IN PRINCIPAL CITIES

WAITE MANUFACTURING DIVISION · CLEVELAND, OHIO

BAY STATE
WHEELS & POINTS
formed from uniform blanks
won't come off the spindles
run absolutely true
ready for immediate cutting action
free from "hard and soft" spots
BAYSTATE
THE BAY STATE METHOD OF FORMING FROM UNIFORM BLANKS IS REALLY SOMETHING! —SEND FOR HELPFUL CATALOG, DESCRIPTIVE FOLDER AND STOCK LIST.
BAY STATE
ABRASIVE PRODUCTS CO., WESTBORO, MASS. U.S.A.

NORTH AMERICAN

AIR-OIL RATIOTROL



● Oil *pressure* is tied to air *pressure* in the NORTH AMERICAN AIR-OIL RATIOTROL. This fundamentally correct pressure principle of proportioning fuel oil with the air for combustion guarantees greatest combustion efficiency.

One main control valve is installed anywhere in the air line supplying any number of burners. The burners can be mounted on various levels or on opposite sides of the furnace.

The system is easy to install and easy to operate. No complicated adjustments or settings are necessary.

The system will provide reduced maintenance, increased production, more uniform products, better combustion efficiency and reduced "breaking-in" time for new operators. Let us mail you the new Ratiotrol Bulletin No. 13-0.

THE NORTH AMERICAN MANUFACTURING COMPANY

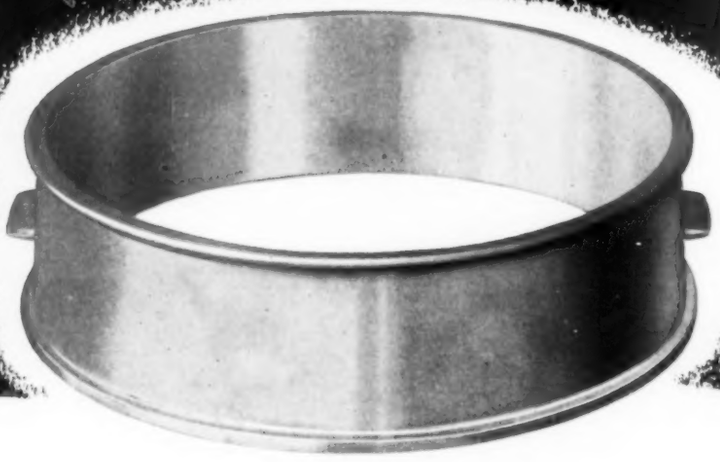
MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL

BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES

CLEVELAND, OHIO

HINES ROUND FLASKS

Save Time, Sand, Space!



These valuable flasks will put jobs on the bench and machines that were previously made on the floor—will replace tight boxes, eliminate shake-out costs and save foundry space—will turn out more good castings with less sand.

Recommended for such castings as fire pots, pulleys, sheaves, sprocket wheels, gears, etc.

Jackets are machined out to fit molds perfectly.

Made in all diameters of even inches from 12″ to 34″.

MAKERS OF FOUNDRY FLASKS AND JACKETS Since 1919

HINES FLASK COMPANY

Phone ACademy 1480

1324 HIRD AVENUE • CLEVELAND, OHIO

DINGS "SELECTIVE SEPARATION"

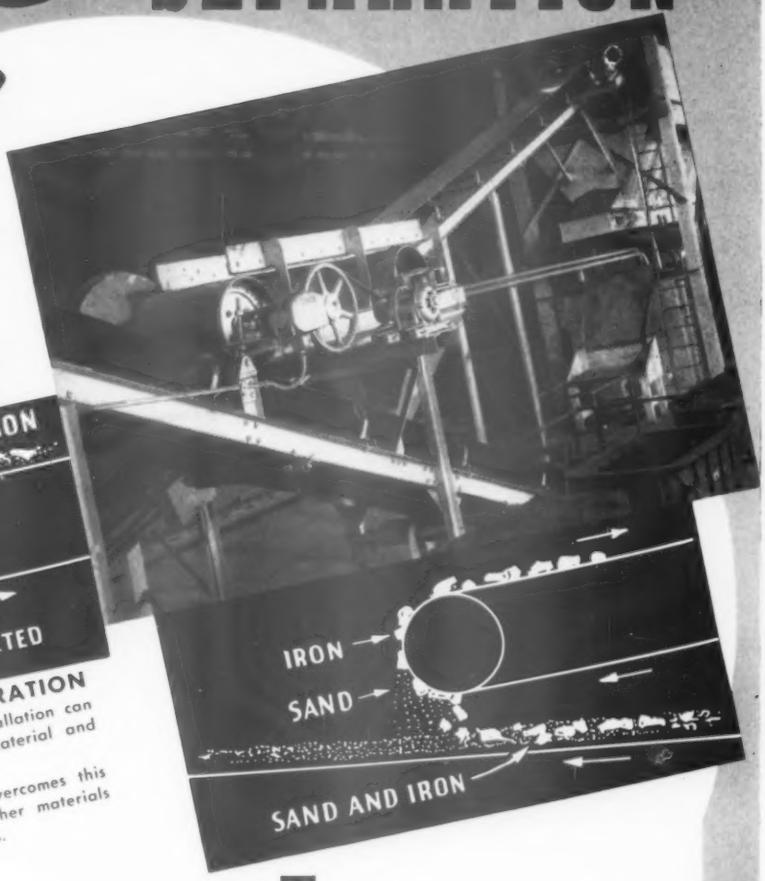
Improves

Sand Conditioning and Scrap Reclamation

PRINCIPLE OF SELECTIVE SEPARATION

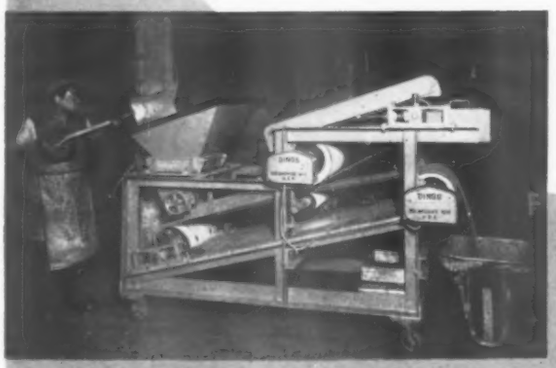
Above—Showing how an ordinary pulley installation can sometimes pocket entangled non-magnetic material and discharge it with the magnetic.

Right—Showing how selective separation overcomes this difficulty with sand, entangled scrap or other materials to effect exceptionally clean-cut separations.



THE installations pictured on this page are typical of Dings ability to make the most effective possible use of the principles of magnetic separation. Dings has had over 40 years experience in engineering individual installations to meet specific problems. Proper application plus separators second to none—that's what Dings offers you.

For separation of ferrous and non-ferrous scrap, cleaning of foundry sand, taking the iron out of slag, handling metal and for other jobs magnetic equipment can do best, come to Magnetic Separation Headquarters.



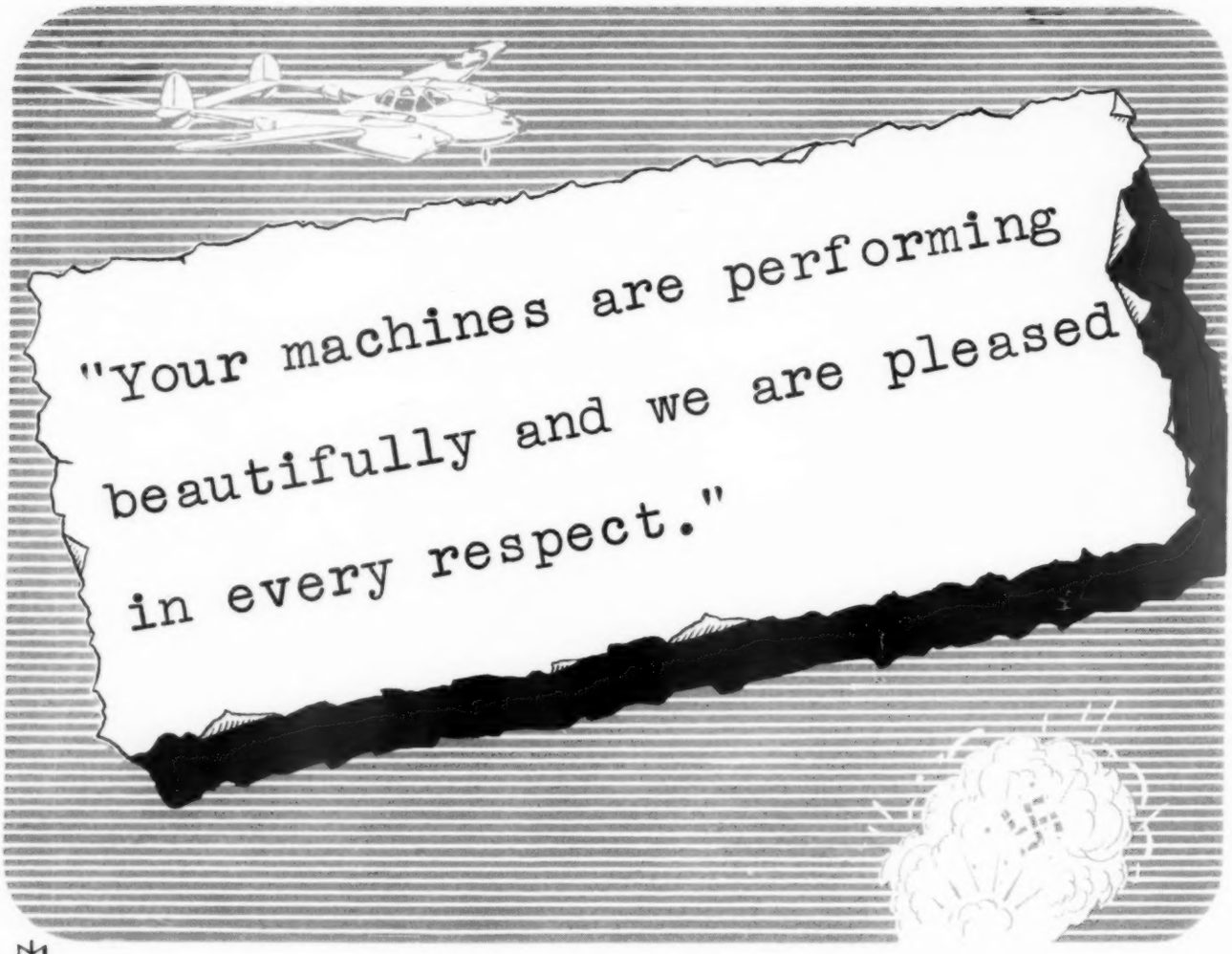
Above—Here's selective separation combined with a dual pulley type separator for scrap separation. Two magnetic pulleys—two separation points for clean, sharp separation.

DINGS MAGNETIC SEPARATOR CO.

512 East SMITH ST. • **MILWAUKEE, WIS.**

World's Largest Exclusive Builders of Magnetic Equipment

Dings MAGNETIC SEPARATION HIGH INTENSITY



"Your machines are performing beautifully and we are pleased in every respect . . . we have produced and shipped more castings than our original . . . promise," writes the manager of a leading foundry producing castings for vital aerial munitions.

This splendid performance of Herman Molding Machines in the war effort is the "rule" rather than the exception. They are a prominent factor in our successfully meeting the demands of our war leaders for increased production to overwhelm the enemy.

Herman engineers have specialized for the past forty years solely in the design of better molding equipment. Records of increasing production 400 to 600 per cent over old methods are not uncommon. Similarly, production time and costs are slashed with Herman's exclusive patented roll-over action and gravity return of roll-over plate which deposits molds directly on conveyor. Rapid, rotary valve control, automatic timing and smooth steady hydraulic pattern draw are other Herman features.

Check the facilities of *your* molding department today. Get all the facts on Herman Molding Equipment. Herman can help you help the War Effort.

MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

You Need NORTON QUALITY
in Your Small Wheels, too

MANY foundries specify Norton wheels for their floor stands and swing frame grinders on the bas's of carefully kept performance records. Similar records are more difficult to keep on portable grinders but you can be sure that Norton wheels will give you the same outstanding performance.

And today, when every ounce of production is vital, it is absolutely essential to use the best possible wheels — wheels research - developed especially for portable grinders — wheels that are tough and rugged to stand up under use by inexperienced workers.

Let Norton abrasive engineers study your portable jobs, too. Let them specify straight, cup and cone wheels in the grains, grades and structures to give you maximum production on your war jobs.

NORTON COMPANY, WORCESTER, MASS.

Distributors in All Principal Cities

W-899

CLOSE CYLINDER VALVE WHEN SHUTTING DOWN

Your regulators are built to give long, dependable service but careless treatment shortens their useful life. It's only sound common sense to give mechanical apparatus the best of care, and today it is essential because replacements are scarce.

For example, always close the cylinder valve when shutting down for long periods. Even if it's only for four or five hours, this precaution removes needless strain on the regulator seat. Repeated several times a week, these sensible "rest periods" add up to a valuable extension in regulator service.

Closing the regulator adjusting screw while setting up a new job is another way to prevent unnecessary wear on your apparatus. This step only takes a minute and eliminates useless pressure on hose and torch valves.

Make yourself a Waste Warden! Stay on guard against careless wear and wasteful practices. Take good care of your apparatus — keep every cubic foot of oxygen and acetylene working for America's smashing victory ahead!

WASTE WARDEN says "Return Cylinders Promptly" and:

DO close cylinder valve after use.
DO check your hose and connections for leaks.
DO keep your cylinder inventory low.
DO keep tips clean and free from carbon and slag.

★ ★ ★

DON'T use excessive pressure.
DON'T use oversize tip.
DON'T leave torch burning when not in use.

Air Reduction

General Offices:
60 EAST 42nd STREET, NEW YORK, N. Y.
IN TEXAS
MAGNOLIA-AIRCO GAS PRODUCTS CO.

AIRCO

WILSON

IDLE CYLINDERS ARE PRODUCTION SLACKERS: *Keep 'em rolling for victory!*

Four Star FEATURES *for* '43

TWISTED STEM CHAPLETS

● Everything you want in a chaplet. The smooth twisted square stem will not collect gas, dust or moisture—offers no place to trap gas.

"The Twist Does The Trick"

The twisted stem guarantees perfect fusion—not just at one deformed spot but from head to head. Four sharp fusion edges the entire stem length.

Stronger, size for size, than any other type of stem. Ample strength guarantees perfect core support.

THE WONDER CUTTER

●

An inexpensive handy tool that should be in every foundry.

Cuts core wires, rods and small band iron, easily and quickly. Capacity in square rods, 3/8"; round rods, 5/8" and band iron up to 1/8" x 2".

Adjustable gauge permits repeated cuts to same length when needed.

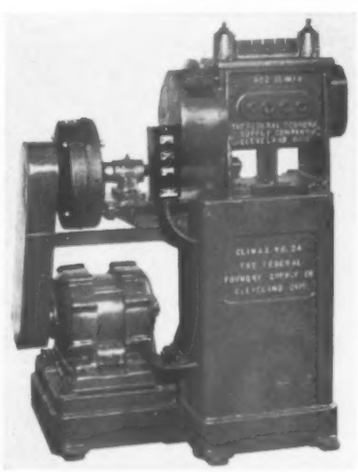
Small compact size makes it easy to mount wherever convenient.

You'll find many uses for the Wonder Cutter.

CLIMAX WIRE STRAIGHTENER

● During 1942 more and more foundries adopted a program of salvaging used core wires and rods for re-use, with the aid of the Climax Wire Straightener.

This year, more than ever, it would be wise for you to investigate the savings from this practice.

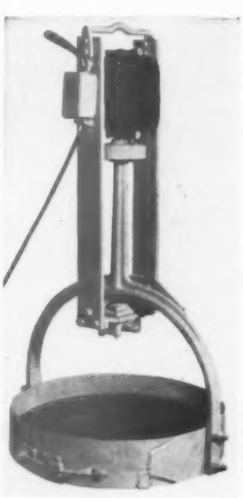


The Climax Wire Straightener is made in 3 sizes and 9 models, each of which will straighten several different sizes of rods.

Our new circular and price list is yours for the asking. Why not write for it today?

THE LOWE ELECTRIC SIFTER

● Faster sifting, longer wearing. A new-design malleable yoke adds new "zip" to the patented Lowe sifting action.



More room above the screen permits faster loading.

Wearing parts are easily and quickly replaceable — a Lowe is never long out of service.

Totally enclosed ball bearing motor gives long low-cost service.

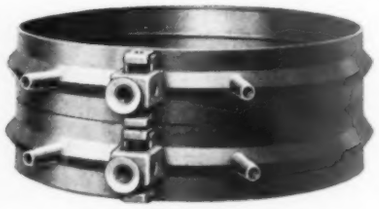
Lowe-sifted sand is better sand.

THE FEDERAL FOUNDRY SUPPLY CO.

4600 EAST 71st STREET, CLEVELAND, OHIO

CHICAGO — CHATTANOOGA, TENN. — DETROIT — MILWAUKEE — MINNEAPOLIS — NEW YORK — RICHMOND, VA. — ST. LOUIS — UPTON, WYO.

Back in 1909, Sterling engineers started to design and build foundry flasks of all sizes, styles and shapes. And they've continued in this specialized field for the past 34 years. Today, the wealth of practical experience accumulated by Sterling is proving invaluable in building flasks for war jobs . . . flasks that retain rigidity and constant accuracy even under the toughest 3-shift production schedules. No wonder more than 3500 foundries regularly specify Sterling Flasks.



Typical Sterling features include rolled steel, one-piece channel with solid center reinforcing rib and square flanges; full width bearing. (Patent Number 1974292)

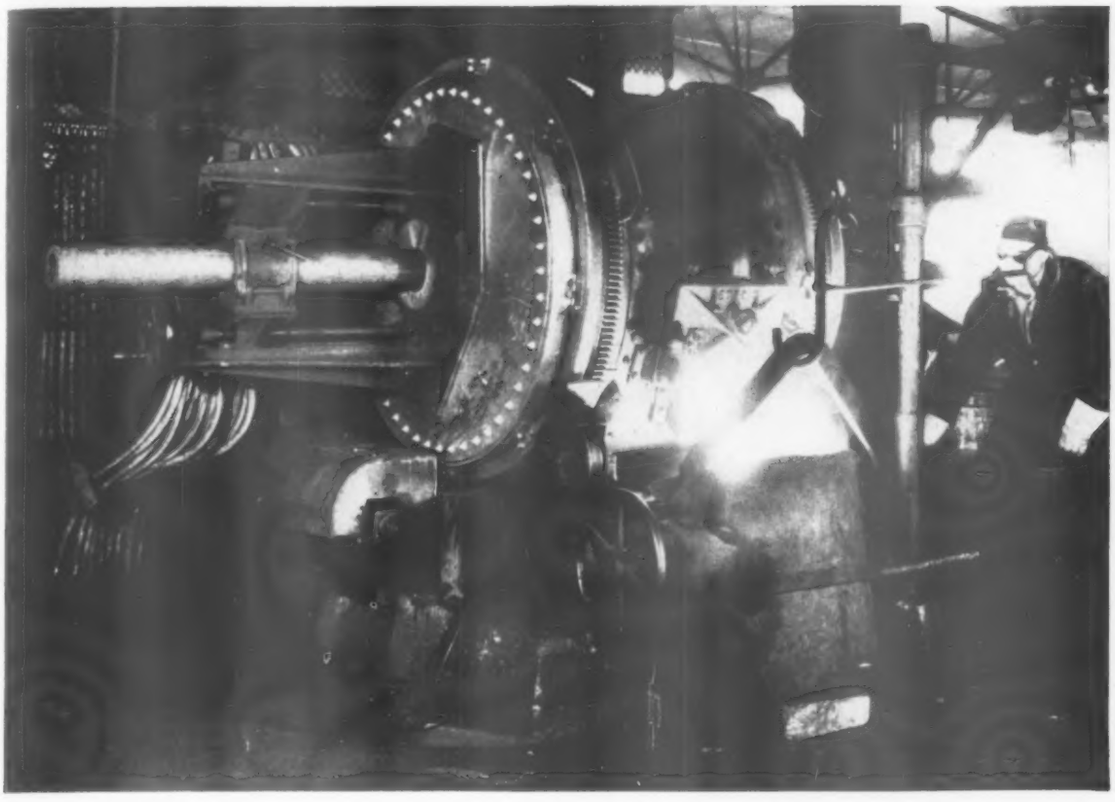
Sterling FOUNDRY FLASKS

Flasks available in all styles and shapes . . . all-welded, special rolled steel sections . . . strong but light, for speed and endurance.

STERLING WHEELBARROW COMPANY • MILWAUKEE, WIS., U. S. A.

A 3949-1P

DETROIT ELECTRIC FURNACES



keep 'em rocking with P. B. SILLIMANITE

Detroit Electric furnaces which are lined with P. B. SILLIMANITE Brick and Special Shapes are setting new records for long life, efficient operation, lower refractory costs per ton of metal produced. Lining life may be extended by maintaining with P. B. SILLIMANITE No. 114 Dry Patch and P. B. SILLIMANITE Air-Setting Cement.

P. B. SILLIMANITE linings are endorsed by The Detroit Electric Furnace Division—The Kuhlman Electric Co. and are made to their specifications. Linings for furnaces with Conical Shells are fitted to a gauge, assembled and match marked before shipment. Consequently, P. B. SILLIMANITE linings may be installed with minimum delay.

Your copy of Bulletin No. 311 is ready. Complete data on P. B. SILLIMANITE for the Metallurgical Industries.

P. B. SILLIMANITE linings are especially recommended in Detroit Electric Furnaces in which these metals are melted:

COPPER and HIGH COPPER ALLOYS • ALLOY IRON • STEEL
SEMI-STEEL • CUPRO NICKEL • NICKEL and MONEL METAL
ALLOY STEEL

CHAS. TAYLOR SONS Co.

MANUFACTURERS OF REFRACTORIES • CINCINNATI • OHIO • U. S. A.

A Change For the Better

by Wheelabrating

THE Airless WHEELABRATOR — quick-working remedy for cleaning room headaches—is recommended by hundreds of "patients" who previously suffered from rheumatic production and anaemic profits.

The prescription is old enough to have survived the acid test of time—and its widespread use is definite proof of its curative powers.

Try it yourself and see if the change isn't for the better. You can do this by asking for a test-diagnosis of your particular cleaning room headache.

A 24 HOUR JOB CUT TO 7 HOURS

"We wish to say that the addition of this equipment to our cleaning machinery has been a step in the right direction. Prior to the installation of the Wheelabrator, we had been operating nine tumbling churns and one sand blasting cabinet. These, we were obliged to run continuously 24 hours a day and then we were never caught up in our cleaning. Frequently, we had very unsatisfactory conditions arising because of not being able to clean up each day's castings before the succeeding day's output was added to the stock of uncleaned castings. We are now able to have an entire day's production of castings cleaned within about seven hours.

Our electric bills have been cut almost into half and we feel that this saving alone, in addition to reduction of manual labor costs, will make the Wheelabrator pay for itself within a comparatively short time."

—*Birdsboro Casting Co., Inc.*

TRADE MARK THE AMERICAN MOLDER
REG. U. S. PAT. OFF.

CLEANING PRODUCTION INCREASED 40%

"We replaced eight large mills with one Wheelabrator and put through larger tonnages by about 40% than we had ever put through our Mill Room before—and did it easily, which we know could not have been possibly done working over time with tumbling mills.

"Another plus which we have found since operating it is the fact that we get a much better finish and a much nicer looking casting — any surface defects which might be overlooked in a tumbled casting are brought right out so there is no possibility of getting such casting into the customer's hands or into our own works where there might be a possibility of adding expense to the already defective piece.

"We haven't figures to show what savings in the machine shop cost is, but the machine shop foreman tells me that his tool wear and breakage has been materially cut down and he is able to machine most items at higher speeds than he did formerly."

—Red Jacket Mfg. Co.

—NO MORE CASTING "PILE-UPS"

"The Wheelabrator which we purchased from you several years ago has been in constant use since its installation. For the first year it was operated day and night with very satisfactory results. Our cleaning department was crowded for lack of space but after the installation of this machine, we were able to take care of a considerable larger tonnage with less space.

We like the increased speed of flow through our cleaning department—no more piling up of castings, using up a lot of valuable space."

—Universal Foundry Co.

1 WHEELABRATOR REPLACES 8 MILLS

"Prior to installing this machine we had four men in our cleaning department. Our hand sand blasting equipment was in operation eight-een hours each day. At the present time we have two men in our cleaning department, and our hand sand blasting of light and fragile castings has been reduced to approximately one hour a day.

It has enabled us to remove eight tumble mills thereby using the floor space they occupied to rearrange our grinding department, which was badly over-crowded."

—The Callander Foundry & Mfg. Co., Ltd.

AMERICAN FOUNDRY EQUIPMENT CO.

Blast Cleaning and Dust Control Engineers

505 SOUTH BYRKIT STREET • • MISHAWAKA, INDIANA

Famous CORNELL FLUXES

Iron, brass and aluminum foundries have been swinging steadily to CORNELL FLUXES because their use brings about definite savings. Castings come out cleaner and more scrap can be used without danger of dirt, porous places and spongy spots. Every casting takes a much higher polish. Tell us the nature of your work, and we will send you special instructions to insure efficient and economical results through the proper use of CORNELL FLUXES.

FAMOUS CORNELL IRON CUPOLA FLUX

Made in brick form, this flux is unusually convenient to use, and will not blow out by force of the blast. Guess-work is eliminated in the matter of using the correct amount of flux per charge. Each briquette, or one quarter brick contains exactly the right amount for fluxing 500 lbs. of iron. Moreover, it costs less to use than fluorspar or straight limestone. FAMOUS CORNELL IRON CUPOLA FLUX brings better and more uniform casting results. Heats are shortened 5% to 10%, iron is considerably hotter, 20% more fluid, and 10% softer if desired. Moreover, the cupola lining lasts considerably longer.

FAMOUS CORNELL BRASS FLUX

Any casting that must stand the pressure test, and have a tough, dense grained metal requires adequate fluxing. The amount of FAMOUS CORNELL BRASS FLUX depends entirely on the nature of the casting, type of work, kind of metal and the amount and character of the scrap that is used. If desired, we will send special instructions concerning the proper use of this flux. FAMOUS CORNELL BRASS FLUX makes metal pure and clean; the castings take a beautiful finish; iron particles between 3% and 4% are eliminated; castings are tougher, there is less shrinkage, crucible or furnace linings are kept clean, and tin and other expensive metals are saved.

FAMOUS CORNELL ALUMINUM FLUX

No ground glass or silica is present in this flux; neither does it contain salammoniac or chloride of zinc, items that are detrimental to use because of the obnoxious gases they produce. Use of FAMOUS CORNELL ALUMINUM FLUX brings castings that are clean and tough, with the added property of being able to take a higher polish. Thinner yet stronger sections can be poured, and more scrap can be used, because this flux cleans up the dirtiest turnings and sweepings. Better castings, increased profits and lower costs can be obtained through the judicious use of this fumeless aluminum flux.

The CLEVELAND FLUX Co.
1026-34 Main St., N.W., Cleveland, Ohio
Established 1917

Industry Should Have Greater Voice In Concentration Programs

CONCENTRATION of production is being talked about more and more by the war agencies in Washington. This is not the type of concentration which has been under way for over two years through limitation and curtailment orders and the conversion of industrial facilities to the manufacture of the implements of war, but pertains to a concentration which may be accomplished by centering the output of any industry in a fewer number of plants, each of which would operate at fairly near capacity. Plants not selected for concentrated production, and unable to convert to war work, would be closed.

The present movement toward concentration is being directed at industries producing civilian type supplies, even though a small or large portion of the production may be purchased by the military services or exported to our allies. Those working with the idea point out that concentration would be feasible only when the total demand for a particular product falls considerably short of the total available unemployed capacity of the industry, or when total requirements for the product probably will not be met, since demand is not sufficient to permit profitable rates of operation in all plants now producing the product.

Reasons for concentration of production recently advanced by an official of the War Production Board may be summarized as follows: 1. To assure the necessary quantity of civilian type supplies by providing sufficient demand to permit certain plants to operate efficiently at a profitable level; 2. To reduce the amount of labor necessary to produce the required amount of goods by centering all production in some plants and closing down others; 3. To move civilian goods production to localities where it will provide the least hindrance to war production, but at the same time will have skilled labor available for the particular manufacturing problems; 4. To relieve local transportation bottlenecks.

While the tremendous difficulties associated with such a program are admitted, the War Production Board is going ahead on the proposition and has established a committee on concentration with Joseph L. Weiner, Director of the Office of Civilian Supply, as chairman. The other members of the committee represent the Director General for Operations, the Labor Production Division, the Smaller War Plants Corp., and the Office of Civilian Supply, all of the War Production Board, and the War Manpower Commission. It is reported the committee is making preliminary studies of all civilian industries to determine those eligible for concentration, and that the most likely candidates will be studied further to determine the desirability of concentration or the type of program to be adopted. While it is reported that any concentration plan is to be discussed with the labor and industry advisory committees of the particular industry before being put into operation, there is no indication that the recommendations of these committees are in any way binding on the WPB-WMC concentration committee.

During the past two years, the British have approached the problem from a different angle. Concentration of production has been based upon the principle that each industry develop its own arrangements to accomplish the desired purpose. After an industry works out such a program, the details are submitted to the government. If it is found that the set up is satisfactory from the standpoint of releasing a sufficient amount of labor and factory space, it is approved. The British also provide for pooling earnings so that closed plants can participate.

Unless industry is given an equal voice with government in decisions governing the concentration of production, and unless the development and operation of such plans can be free from politics and sectionalism, it would seem that concentration of production, as now being planned by the WPB, threatens an important section of American industry.

Frank G. Steinebach
Editor

Producing M

By EDWIN BREMER

Fig. 1—Crucible of molten magnesium being taken from furnace to the foundry. Fig. 2—Pouring a large sand casting. Inhibitor is being sprinkled on molten metal to prevent burning. Fig. 3—Pouring molten magnesium into sand molds in the bench foundry. Fig. 4—Checking the temperature of ladles of molten magnesium at a thermocouple "temperature station" in the foundry. Fig. 5—Pouring magnesium into a large mold in the background. Foreground shows a cored mold ready for closing

Magnesium Castings

WHILE magnesium is the fourth most abundant metal in the world, difficulties in developing suitable extraction methods and lack of demand for the material militated against the appearance of magnesium as a metal of industrial importance until comparatively recently. Initially isolated by Sir Humprey Davy in 1808 magnesium first was produced commercially in France by Rousseau in 1857, and later in England. However, until 1896 when electrolytic production of magnesium from fused chlorides was begun at Bitterfeld, Germany, it only was used in the form of wire or ribbon for photographic purposes.

Earliest record of commercial production in this country indicates a firm in Boston in existence from 1865 to 1892 making wire and ribbon for photographic purposes. Outbreak of the First World war in 1914 not only provided the stimulus for increased production of magnesium in Germany as substitute for copper and other nonferrous metals, but also revived interest in its production for military purposes in this country, since supply was cut off. With the armistice and elimination of wartime demand most of the activity in this country ceased. Experimental work was continued in spite of rapidly increasing foreign imports.

Just how far this country has come along the road in making magnesium an important industrial metal can be indicated clearly by stating that in 1915 production was 87,500 pounds, and the price per pound was $5 or 31.25 cents per ounce. Today its price per pound is 72 per cent of the price per ounce in 1915 or 22½ cents. According to the War Production Board magnesium production at the close of 1942 was at the rate of 260,000,000 pounds per year A program to raise U. S. production well over 600,000,000 pounds per year is well under way. Of perhaps even more interest to the foundry field is the fact that today the Buffalo plant of the American Magnesium Corp. alone produces in one month more sand-cast magnesium alloys than the whole industry did in the last full peace-time production year.

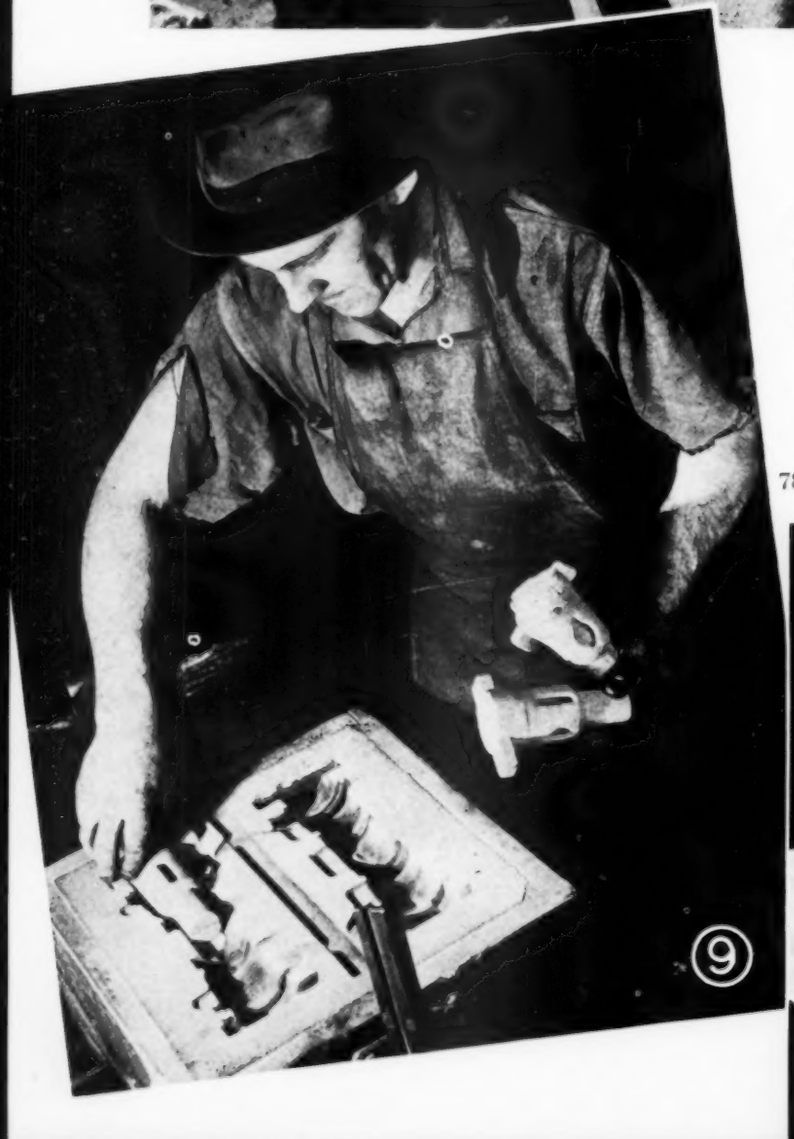


Fig. 6—Placing cores on a rack which will then be placed in the oven. Fig. 7—Shaking the sand from casting by means of a vibrator on the foundry floor. Fig. 8—Sawing gates and risers from a magnesium casting. Fig. 9—Placing sand cores in a mold. Fig. 10—Assembling cores in a sand mold. Fig. 11—Magnesium castings being lowered into a hot chrome pickle bath

Due to increasing demands for magnesium castings, many foundries previously engaged in other fields have begun manufacture of magnesium castings for the first time, or are contemplating the changeover. Since production of magnesium castings is so decidedly different from production of other types of castings it is in order to point out wherein the differences lie, and what precautions must be observed to insure sound castings.

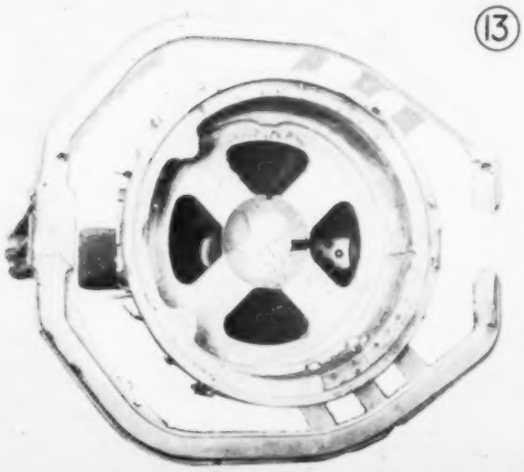
Throughout this article the term magnesium refers to alloys rather than the pure product since the latter seldom is made into castings. Also while there are a number of magnesium alloys used in the foundry, the bulk of production is in two alloys. One contains 9 per cent aluminum, 2 per cent zinc, 0.2 per cent manganese, and remainder magnesium while the other is comprised of 6 per cent aluminum, 3 per cent zinc, 0.2 per cent manganese, and remainder magnesium.

The first of the two alloys generally is used in the heat treated state and possesses high resistance to corrosion, good casting characteristics and pressure tightness. Typical tensile strength in the as-cast state is 23,000 pounds per square inch, a yield point of 14,000 pounds per square inch, and an elongation of 1 per cent in 2 inches. Heat treatment increases the tensile strength to 39,000 pounds per square inch, the yield point remains at 14,000 pounds per square inch, and the elongation increases to 10 per cent. With heat treatment and aging the tensile strength is 38,000 pounds per square inch, the yield point 20,000 pounds per square inch, and the elongation 3 per cent in 2 inches.

The second alloy containing 6 per cent aluminum and 3 per cent zinc widely used in the as-cast condition has a corrosion resistance equal to the first mentioned alloy. The casting characteristics and pressure tightness are somewhat inferior to the first alloy. Typical tensile strength in the as-cast condition is 27,000 pounds per

(12)

(13)



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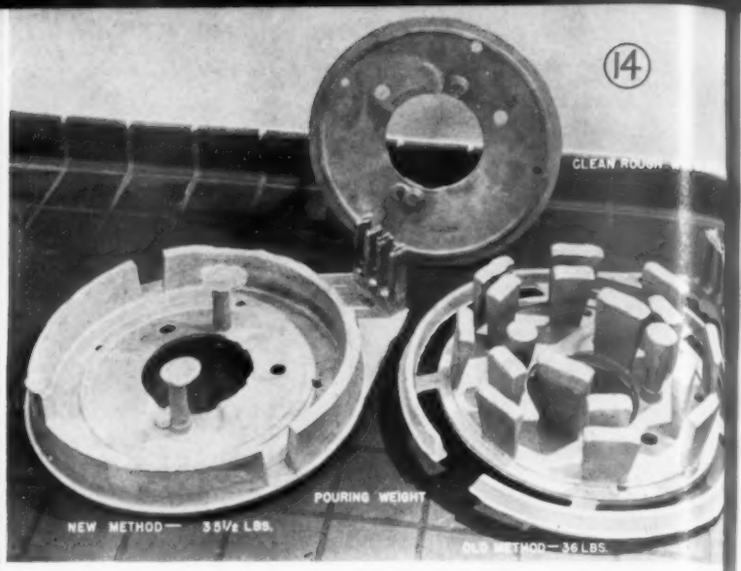

square inch, yield strength 11,000 pounds per square inch and elongation 6 per cent in 2 inches. With heat treatment the tensile strength is 37,000 pounds per square inch, the yield strength 12,000 pounds per square inch, and the elongation 9 per cent. With heat treatment and aging the tensile strength is 36,000 pounds per square inch, the yield strength 18,000 pounds per square inch, and the elongation 4 per cent in 2 inches.

Proper Procedure Overcomes Difficulty

Most striking characteristic of magnesium is its lightness—a valuable feature in structural applications, but one which may lead to considerable grief in founding unless it is kept in mind at all times. Magnesium is about 64 per cent the weight of aluminum and only 23 per cent that of ferrous materials. Its light weight should prepare the mind of the foundryman to expect certain difficulties in making magnesium castings—difficulties which fortunately can be overcome by proper procedure. The low specific gravity means that molten magnesium does not differ greatly in weight from that bane of the foundry —nonmetallic inclusions. It also means that the pouring pressure or head is relatively low. Other outstanding characteristics of magnesium are the ease of oxidation at temperatures just above its melting point, and the comparatively high shrinkage. While magnesium, unlike aluminum, does not attack or dissolve iron, molten magnesium does reduce silica in molding and core sands. Hence, all scrap should be abrasive blasted before remelting to eliminate as far as possible any silicon pick-up.

Before describing melting and molding procedures, it might be well to dwell on the fire hazard in founding magnesium. While that phase is ever present, the American Magnesium Corp. points out that insistence on application of good housekeeping principles throughout the foundry, following definite routines, and use of good common horse sense will hold that danger at a minimum—in fact to a point where fires practically are non-existent. To reach that state constant vigilance must be exerted, and carelessness cannot be tolerated.

Fires are most likely to occur in melting and handling the molten metal and in the cleaning department. In melting and handling molten magnesium it is essential that the molten metal is covered at all times with a reasonably thick coating of flux to prevent as much as possible the access of air. That simply means attention is given to the pots and small additions of flux made when oxidation breaks through the (*Please turn to page* 138)

Fig 12—Two views of reduction gear housing for radial type airplane motor with conventional gating. Pouring weight 181 pounds. Fig. 13—Two views of same casting using Ford gating method with central riser. Pouring weight 106 pounds. Fig. 14—Old and new methods of making a magnesium casting. Fig. 15—Checking dimensional accuracy in the layout department. Fig. 16—Rough grinding. Fig. 17—Checking dimensions. Fig 18—Gaging a magnesium aircraft wheel casting.

Produces steel continuously in a Light Castings Foundry

By C. H. KAIN
and
L. W. SANDERS
Lake and Elliot, Ltd.
Braintree, Essex, England

THE methods outlined in this article are employed in a foundry producing 95 to 100 tons of finished carbon steel castings weekly. Although this is a modest tonnage, it is just double the output for which the plant originally was designed. As the castings are almost entirely light and made in green sand, the floor space must be utilized to the utmost for the production of molds. A typical week's output was made up of over 5,000 castings totalling 97 tons. The average weight is 38 pounds with very occasional castings falling in the hundredweight (112 pounds) and upward class. This output can only be maintained by careful planning and working to a predetermined program. The planning is based on the number of molds which can be produced in a given time by the equipment installed. The core output is adjusted to suit this, the molds finished, cored up, and closed as made.

It is then necessary to have liquid steel available to pour the molds, in order that the floor may be cleared and the cycle repeated. This is a description of the steps taken to standardize steel production so that molds may be poured when ready.

Two processes are in use, the basic electric and the tropenas or side blow converter. This combination has two great advantages:

(a) The basic electric furnace can use a wide range of scrap and produce a low-phosphorus, low-sulphur metal, the remelt from which can be used in conjunction with west coast hematite in the tropenas to produce steel with a phosphorus and sulphur content comparable with electric steel.

(b) The electric furnace can be adjusted to produce a heat of steel at precise intervals (of 4 hours in this case), day and night, while the tropenas can produce heats at high speed during the peak casting period which in most foundries is during the afternoon.

As there are so few castings of large weight, it is possible to open up the nozzle on a mold of several hundredweights (112 pounds) capacity and, if it were possible, it would be undesirable as the standard steel is at much too high a temperature for heavy castings.

Hand-shanking from both types of furnace is practiced to a great extent, small molds being poured in this manner without difficulty.

Table I shows the timetable which is worked in the foundry under consideration. Each process is considered in three phases. Those for the electric furnace consist of charging and melting; oxidizing, (converting and slagging off), and reducing (refining), finishing and tapping. For the converter the phases are melting and desulphurizing; blowing (converting), and finishing and tapping.

Table II shows the standard timetable which is aimed at for both processes.

It is not proposed to deal in detail with the chemistry of the processes, as both are fairly well-known, but to describe the mechanism of standardized steel production.

The basic electric furnaces in use are of the electro metals type with two top electrodes and a conducting hearth. They are rectangular in shape with nut and screw operated tilting and elevating gear. The maximum capacity is 50 hundred-weight (2.8 tons) and charging is entirely by hand. The nominal rating is 650 k.v.a.

The basis of the process lies in standardization of the charges, a controlled boil and speed in working.

The charge is made up of 45 to 47 hundred-weight (5040 to 5264 pounds) of mixed cold scrap of variable size and consisting of approximately 75 per cent scrap and 25 per cent steel turnings. The heavy scrap is charged first, directly under the electrodes, light scrap is charged around the electrodes and in the center of the furnace, and the steel turnings round the sides.

It is found that even slight (*Please turn to page* 141)

Table I

Tapping Times

Electric Furnace A	Electric Furnace B	Converter	
2:00 a. m.		1:30 p. m. Soft	
6:00 a. m.		2:15 p. m. Hard	
	9:00 a. m.	2:45 p. m. Soft	
10:00 a. m.		3:15 p. m. Soft	
	1:00 p. m.	4:00 p. m. Hard	
2:00 p. m.		4:30 p. m. Soft	
	5:00 p. m.	5:15 p. m. Soft.	Delayed to permit 5:00 p. m. heat from B.
6:00 p. m.			
10:00 p. m.			

Table II

Standard Timetable

Electric Furnace	Time	Converter	Time
Previous tap complete	9:00	End of heating period	12:45
Fettling furnace complete	9:15	Fettling complete	12:57
Charging complete	9:45	Charging complete	1:00
Melting complete	11:45	Blowing complete	1:22
Slagging off complete	11:50	Finishing and recarburizing	1:25
Finishing complete	12:50		
Ready to tap	12:55	Ready to tap	1:28
Tap complete	1:00	Tap complete	1:30

A·F·A plans St. Louis War Conference

SECOND annual conference of the American Foundrymen's Association to be held during the war and scheduled for St. Louis, April 28, 29 and 30, will be intensely interesting with many "off the record" panel discussions according to plans announced by the association's program committee. The general program committee, under the chairmanship of Fred J. Walls, International Nickel Co., Detroit, has numerous assistants in the committees of the various divisions. Meeting the war production needs has emphasized a great number of problems which will be discussed in the papers and talks scheduled.

Probably the greatest interest is attached to the foundry practices for aluminum and magnesium castings. This particular program will be handled by the recently organized aluminum and magnesium division under the chairmanship of Dr. N. E. Woldman, Eclipse Aviation Division, Bendix Aviation Corp.

The malleable division under the chairmanship of Carl F. Joseph, Saginaw Malleable Division, General Motors Corp., will sponsor a three-session symposium on melting practices, covering all the standard and special melting methods.

The gray iron division plans to hold a two-session symposium on "Cast Iron as an Engineering Material." The symposium development is under the supervision of R. G. McElwee, Vanadium Corp. of America. Mr. McElwee also is connected with the War Production Board at Washington. In addition the gray iron division will sponsor sessions on cupola practice and the increasing use of scrap in melting.

The brass and bronze division under the chairmanship of William Romanoff, H. Kramer Co., will discuss recommended foundry practices for the various standard alloys and those which are in demand for war uses.

Steel foundrymen will be served through the several sessions of their division which will stress melting developments and testing. The division chairman is C. E. Sims, Battelle Memorial Institute, with T. N. Armstrong, International Nickel Co. as chairman of the program committee.

Round table or panel discussions are being sponsored by the committees on plant equipment, pattern making, apprentice training, foreman training, job evaluation, sand control and research, safety and hygiene and foundry costs.

To Present First Foundation Lecture

A high point of the conference will be the address by John W. Bolton, Lunkenheimer Co., Cincinnati, who will present the first A.F.A. Foundation lecture. A large number of officials of the Federal and Army and Navy groups will be present to address the various sessions.

The St. Louis District Chapter, under the chairmanship of C. B. Shanley, will act as host to the conference. Mr. Shanley has appointed the following as chairmen of the various chapter convention committees and those attending will find that everything possible has been done to make this conference most profitable from the standpoint of aiding in the war production efforts of the foundry industry:

General Chairman, L. J. Desparois, Pickands Mather & Co.; General Vice Chairman, W. Kammerer, Midvale Mining & Supply Co.; Chapter Chairman, C. B. Shanley, Semi-Steel Casting Co.; Secretary-Treasurer, John Williamson, M. A. Bell Co.; Chairman, Hotel Committee, Eugene Ballard, National Bear- (*Please turn to page* 148)

By PAT DWYER

Cylinder Head Cores Made Without Wires

THROUGH the courtesy of the Aviation Division Studebaker Corp., approximately 100 prominent foundrymen recently were given the opportunity of witnessing a practical demonstration of how the molds for aluminum alloy cylinder heads for radial aircraft engines can be made without the use of wires for reinforcing the extremely thin strips of sand between the vanes or fins. The demonstration was staged in a section of the gray iron foundry of the Studebaker Corp., South Bend, Ind., where the idea was conceived, equipment set up and experimental work was carried on and brought to a successful conclusion by R. J. McSherry for many years manager of the Studebaker foundry, and D. E. Whitehead, foundry superintendent, Wright Aeronautical Corp., Cincinnati.

Developers of the method and their principals generously state that any person or firm interested in the production of cylinder head castings, is welcome to the use of the process. This feature in itself is typical of a trend in recent years toward universal interchange of information and is in marked

Fig. 1—Flask and pattern are mounted on a rollover type machine. A powerful vibrator is kept in operation while the flask is being filled with sand through a pendent swinging spout attached to the head of a sandslinger

contrast to the conservative and secretive attitude which prevailed not only in the foundry, but in practically all forms of industry in former years.

Development of the air cooled cylinder head for radial engines a few years ago presented an extremely difficult problem to the foundryman, from a metallurgical and also from a production standpoint. As with everything connected with aircraft the weight had to be held to a minimum. Maximum strength was required to withstand heat and constant explosive shock. Pattern equipment had to be designed and constructed to facilitate production in immense quantity and at reasonable expense.

Composition of the metal employed in individual foundries varies to some slight extent depending on local conditions, including size and shape of the casting, but in a general way the composition closely approximates alloy No. 142 made by the Aluminum Co. of America. This alloy contains copper 4.00 per cent, magnesium 1.50 per cent, nickel 2.00 per cent and the remainder aluminum and meets S.A.E. specification 39; A.S.T.M. specification B26-37 T alloy CC; U. S. Navy specification M 212a Class 5; U. S. Army or Air Corps specification 57-72-1C Grade A; Federal specifications QQ-A-601 Class 6. Physical properties include ultimate strength 23,000 pounds per square inch; yield strength 24,000 pounds per square inch; elongation 1.00 per cent in 2 inches; brinell 80 with 10 millimeter ball and 500 kilogram load; shear strength 24,000 pounds per square inch; endurance limit 8000 pounds per square inch; Charpy value 0.6 foot pounds. These data are for metal in the as cast condition. Improved mechanical properties are secured by suitable heat treatment.

Solved Many Problems

While the metallurgist was engaged in the development of a suitable composition for the castings, the patternmaker was confronted with the problem of producing a pattern that would draw out of the sand, and the foundryman was faced with the even more difficult problem of preventing the thin sand vanes from collapsing either in the green state or later when subjected to the force of flowing metal.

To secure maximum radiation, the outside of the cylinder head is provided with a great number of deep fins or vanes varying in depth from 2 to 4 inches and ⅛-inch thick. Vanes are spaced ⅛-inch apart. For the pattern, the vanes are formed from sheet brass and inserted in slots in the body part and anchored by a rod or rods on the inside of the half shell pattern. In addition they are brazed or soldered in the slots. Obviously microscopic accuracy is essential in setting the vanes so that the thin bodies of sand between them will not be disturbed, or broken when the pattern is lifted from the mold.

With a pattern functioning satisfactorily, the foundryman had to select a sand mixture that could be packed readily in the limited spaces, sand with the sufficient strength to stand up in the green state, strong enough in the baked state to resist the force of flowing metal, permeable enough to allow gas (*Please turn to page* 150)

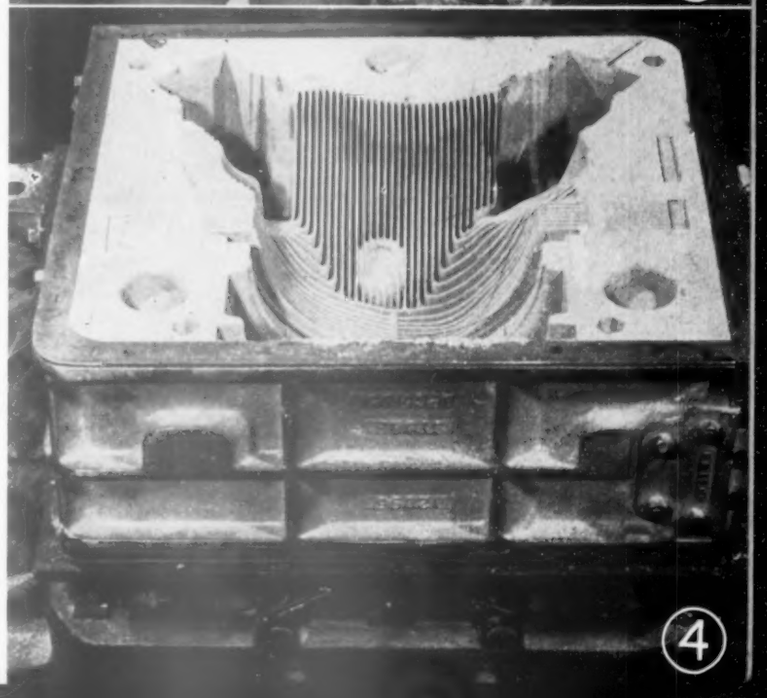

Fig. 2—Shows the cope half of the pattern and immediately below the casting front and back. The left view shows the gate and massive feeders. Fig. 3—A vibrating riddle deposits the first sand in the vanes of the pattern. Fig. 4—Drag half of the core before the hinged corebox is removed. The three depressions in the joint receive corresponding bosses on the cope half when the two halves are assembled to form the mold

Chesapeake Chapter furthers Training of Foundry Workers

By DONALD F. LANE
Director of Training
Bethlehem Steel Co.
Sparrows Point, Md.

TO ACCELERATE the breaking in of new learners and apprentices and the up grading of semiskilled workmen, related courses of study were developed by members of the Apprentice Training Committee of the Cheasapeake Chapter of the A.F.A. who represent a cross-section of the foundries in the Baltimore metropolitan area. After analyses were made of the work that flowed through many of the representative foundries, such related technical information was added as was deemed absolutely essential for a learner or apprentice to rapidly progress through his orientation of progressive job skills.

This related information was divided into two courses of study. The first course was offered to apprentices and beginning workers who had been employed in the foundry industry for a period of 1½ years or less. The second or, advanced course was offered to men whose foundry experience ranged from 1½ to 4 years. Men working in nonferrous or cast iron foundries were eligible to enroll in either course.

Upon the recommendation of the Apprentice Training Committee, an application blank was developed as is shown on this page. This application was circulated to all foundries so that the applicant could receive careful guidance from the foreman or superintendent when desiring to register for any of the instruction courses.

Apprentices and learners were encouraged to attend these classes. In many cases special privileges were granted apprentices and learners so that they were able to attend class on time and complete the course satisfactorily.

On Wednesday, Feb. 25, 1942, thirty-five foundrymen completed 12 weeks' course of related technical instruction. This number represented the elementary and the advanced course. Each of these courses was conducted at the Baltimore Polytechnic Institute every Monday and Wednesday evening from 7:30 to 9:30 p. m. The elementary course was taught by George L. Webster, foundry instructor at the Baltimore Polytechnic Institute, and the advanced course by Thornton C. Worley, assistant general foundry foreman, Bethlehem Steel Co., Sparrows Point, Md. The following companies were represented in these mentioned courses: American Hammered Piston Ring Co., American Brake Shoe Foundry Co., Flynn & Emrich Co., Gibson & Kirk Co., American Radiator & Standard Sanitary Co., Kennedy Foundry Co., Bethlehem Steel Co., Balmar Corp., J. J. Lacy Co.

Outlines of the elementary and advanced foundry courses are presented later in this discussion.

Starting the first week of March, 1943, two similar courses in practical foundry work will be offered to men employed in the foundry industry. These courses will be given from 6:30 to 9:30 p. m. every Monday, Tuesday, Wednesday and Thursday evening.

The purpose of these courses is to give learners, apprentices and other workmen in the foundry an opportunity to further broaden their industrial experience. Special emphasis will be placed on practical problems as well as the up grading of the individual's own interest and desires. Applicants working either in nonferrous or cast iron foundries will be eligible to take this course. Applicants other than those working in the foundry will also be eligible to receive this practical training.

Contents of Practical Foundry Course

I. Actual Molding
- A. Care of sands
- B. Ramming and reinforcing
- C. Gating
- D. Risers
- E. Types of patterns used

1. Flat back.
2. Irregular parting.
3. Use of cover cores.

(*Please turn to page* 152)

Application For Foundry Course

Course desired: ..... Date: .....
Name: ..... Age: .....
First Middle Last
Social Security Number: .....
Company employed: .....
Check No.: ..... Present Job: .....
Length of service on present job: ..... Years ..... Months
Educational Experience:
(Place a circle around the highest grade which you *completed.*)

1. Grade School: 1 2 3 4 5 6 7 8
2. High School: 1st yr. 2nd yr. 3rd yr. 4th yr.
3. Day School Last Attended: .....
4. Date Graduated or Left School. .....
5. Write any other school experiences, such as night school, trade school, college, correspondence school, etc., below:
   .....
   .....
6. Indicate with a check mark which of the following courses you have studied:

Addition	Free-Hand Sketching
Subtraction	Blue Print Reading
Multiplication	Mechanical Drawing
Division	Architectural Drawing
Decimals	Related Foundry (Theory)
Fractions	Sheet Metal Drawing
Ratio & Proportion	..... Drawing
Square Root	General Science
Cube Root	Chemistry
Algebra	Physics
Plane Geometry	Foundry Practice (Practical)
Solid Geometry	.....
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HINTS on converter practice

By FREDERICK G. SEFING
International Nickel Co.
New York

THE bessemer process is the oldest of the modern methods of steel making. Because of its high speed of production with simple equipment the bessemer becomes an important war time steel production furnace. Desulphurizing cast iron in the ladle with soda ash and controlling the time of the blow with the aid of the electric eye have aided in the production of quality bessemer steels. These factors have permitted these steels to assume a place of increasing importance in the war effort in foundries and steel mills.

Although the operation of the converter is simple, it requires considerable skill to control the time of the blow and in some cases the temperature of the metal in the short 15 or 20 minutes required for each heat. The operator's skill will improve more rapidly, however, with a better understanding of the few principles involved in blowing a converter heat.

In the first place the bessemer is simply a device to oxidize impurities in molten cast iron by blowing air, which is one-fifth oxygen, through the molten metal. This oxygen combines with the silicon, manganese, carbon and some iron of the charge and the oxides formed go either to the slag or are blown out with the gases. This oxidation generates a large amount of heat which raises the temperature of the metal to 2900 degrees and as high as 3200 degrees Fahr.

Control of Metal Composition—Metal resulting after the blow is a fairly pure iron with small amounts of impurities. To the blown metal is added the necessary amounts of carbon, silicon, manganese and other alloys to produce the desired composition steel. It is important then that the silicon, manganese, carbon of the blown metal be reduced to the same level in each heat so that it can be depended upon to have, for example, close to 0.05 per cent each of carbon, silicon and manganese and less than 0.05 per cent of sulphur or phosphorus. Such a particular composition metal can be depended upon to produce a specified steel with the addition of the proper amounts of recarburizer and alloys.

The proper operation of the bessemer, therefore, depends upon burning out the carbon, manganese and silicon to these low levels without burning up too much of the iron. It is to be remembered that molten iron is burned readily to iron oxide by a stream of air but as long as over 0.05 per cent carbon, silicon or manganese remain in the melt, they tend to reduce the iron oxide back to iron while they themselves take up the oxygen and are removed to the slag or gases.

To continue the heat beyond the 0.05 per cent level of the carbon means that the excess oxygen is used to burn up iron which results in excessive iron oxide in the blown metal and in slightly smaller yields. All of which is wasteful. The excessive oxides require greater quantities of recarburizers and deoxidizers. Furthermore, an overblow of 30 seconds for example causes loss of about 0.7 per cent iron or about ¾ of a ton in 100 tons.

Most of the silicon and manganese are removed early during the blow with a characteristic short greenish flame, while the carbon burns out with a long yellow flame which changes in color and appearance when the carbon is reduced below about 0.15 per cent. The exact point of which the oxidation should be stopped, at 0.05 per cent, is determined by the color and intensity of the blow. To do this regularly under varying atmospheric light conditions from heat to heat and day after day requires considerable skill. To aid the operator in this exacting service the electric eye serves well in selecting just the right color and light intensity when the converter is to be turned down and thus hit the desired 0.05 per cent carbon point which then will be constant from heat to heat. In metal blown to 0.05 per cent carbon, for example, both the silicon and manganese will have been reduced to between 0.03 and 0.06 per cent. Heat after heat of close analysis blown metal can be made readily with the aid of the electric eye which makes it relatively easy to control the composition desired.

Control of Metal Tempera- (*Please turn to page* 156)

Table I

Heat Balance of Converter per ton of Charge

Charge: 3.25 per cent Carbon, 1.75 per cent Silicon, 0.50 Manganese, cast iron (assume 2.5 per cent Fe burned)
Blown Metal: 0.05 per cent Carbon, 0.05 per cent Silicon, 0.05 per cent Manganese

	Sources of Heat	Btu's per lb. of element burned	Btu's per ton of cast iron
1.	34 pounds Si to SiO_2	12 600	428,400
2.	9 pounds Mn to Mn SiO_3	3,160	28,440
3.	48 pounds or ¾ of the C to CO	4,450	213,600
4.	16 pounds or ¼ of the C to CO_2	14,600	233,600
5.	50 pounds Fe to $FeSiO_3$	2,400	120,000
6.	Heat developed by oxidation		1,024,040
7.	Possible heat from burning the CO in item 3 to CO_2 over the metal bath		487,200
8.	Heat in charged cupola iron at 2750° Fahr. (1 Ton molten iron heated through 100° Fahr. requires 7200 Btu)		1,209,000
9.	Total heat input		2,233,040
	Heat Used:		
10.	Heat in 1843 lbs. of blown metal at 3000 degrees Fahr.		1,160,000
11.	Heat in slag (148.5 lbs.) at 3000 degrees Fahr.		147,000
12.	Heat in gases leaving converter at 2750 degrees Fahr.		608,000
13.	Total heat accounted for		1,915,000
14.	Unaccounted for losses by Heat lost through converter lining		318,040
15.	Heat in converter lining at 3000 degrees Fahr is the same at the beginning and at the end of the heat. Refer to *Metallurgical Calculations*, Vol. II, by Richards.		

Fig.
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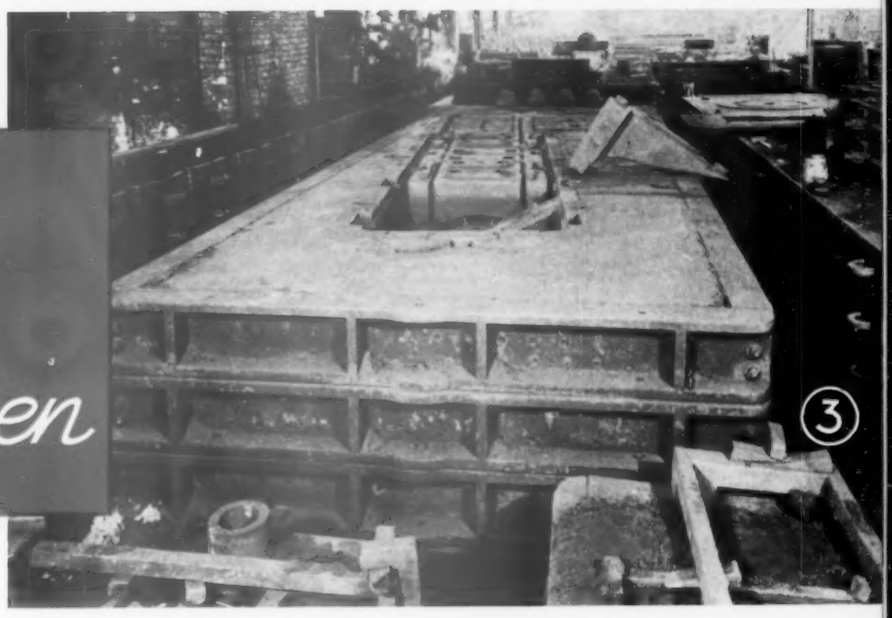
Fig.
exc

n Continuous Oven



By PAT DWYER

PRACTICE of drying molds in the foundry may be dictated either by prudence or necessity, especially in the manufacture of medium weight and heavy castings. In either case experience seems to indicate that the additional cost involved in drying the molds either on the surface or all the way through, is offset by reduction in the number of defective castings. Cost of drying the molds before they are filled with metal properly may be regarded as an insurance feature.

In addition to removing the potential hazard always presented by the moisture in green sand, the dry sand mold has a harder and firmer face to resist the pressure of the molten metal and through this factor produces a casting closer to anticipated dimensional limits. On castings that are machined extensively, the difference in the amount of metal removed from a casting made in a green sand mold, and a similar casting made in a dry sand mold, is quite appreciable. This difference in weight increases in proportion to the size, weight and especially the height of the casting in the mold. Obviously, with two castings of equal weight, the static pressure is greater in a deep mold than in a shallow mold. Obviously, also a green sand mold will yield to this pressure to a greater extent than a comparatively hard firm mold.

Present day conditions introduce a factor that either was absent or almost negligible in a former era when an ample supply of highly skilled molders always was available. While the morals, habits, clothing and table manners of some of these hardy artisans would not draw a prize in any competition, they could make molds with practically no instruction or supervision. Unsought advice or correction from any source was considered sufficient reason for resigning the position in the accepted formula for the period "Gimme me time".

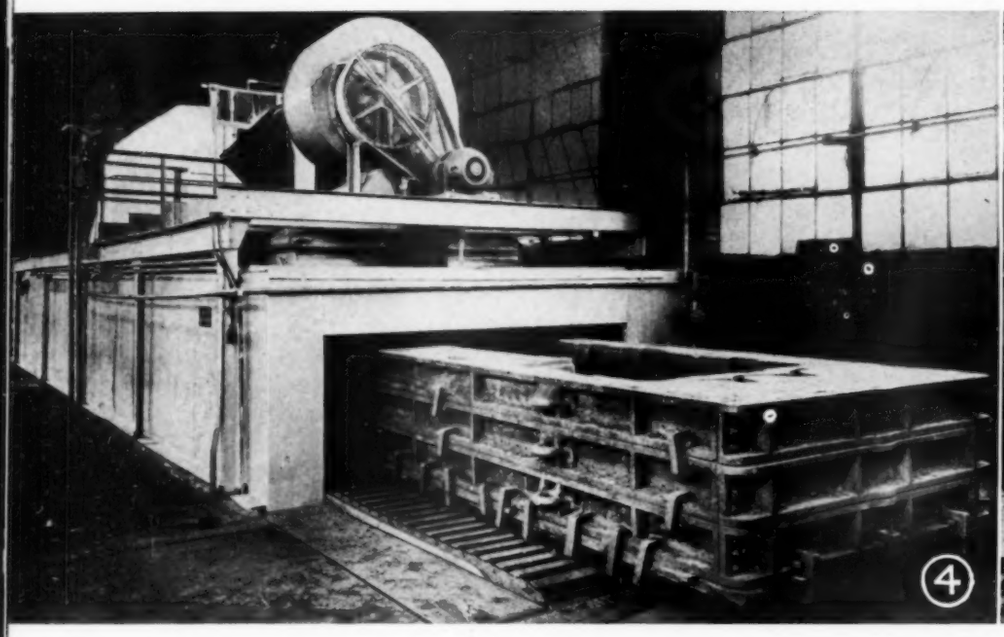
Advancing age, depressed conditions in the foundry industry for the past 10 or 12 years and lack of infiltration of new blood, reduced the molding army to a point where it was inadequate to meet the demands of foundries pushed to peak capacity as a result of the present emergency. Managerial ingenuity and resource were taxed heavily in recruiting and training available, but unskilled labor. Mechanical equipment was introduced wherever possible to expedite production and to remove many of the hazards incident to the fallibility of the human element. An interesting example of the manner in which the various problems were solved is presented in the gray iron machine tool foundry of the Kaukauna Machine Corp., Kaukauna, Wis.

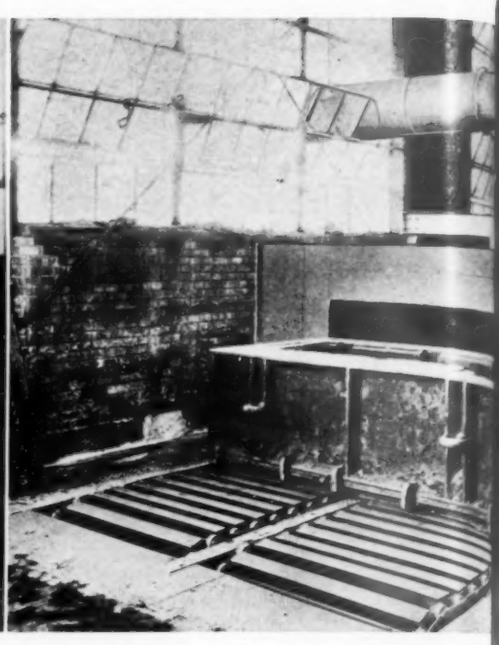
Commencing at the south end of the foundry, the molds move through successive stages to a point near the north end where they are shaken out and the castings are lifted on to the cleaning room floor. The method of sand recovery, reconditioning and reclamation at two points on opposite sides of the main bay, will be taken up later.

Medium and large size molds are rammed under a stationary type sandslinger. The operator rides on the ramming head and directs the stream of sand required in the various flasks arranged on the floor within the radius of the machine. The empty flasks and the filled molds are handled by an overhead electric traveling crane. With the exception of a narrow space at one side occupied by the sand conveyor, the arm of the machine with an effective radius of 20 feet, swings through a complete circle. After each mold is rammed, it is lifted to a vacant place on the floor out of range of the machine. Another flask with pattern is placed under the machine. In that manner, with a variety of flasks constantly in position, the machine is steadily employed.

Each rammed mold is opened and the pattern is extracted. Any minor imperfections are repaired by expert molders and then the face of the mold is sprayed with

Fig. 1—Snap flask molds enclosed in metal slip jackets are placed on roller conveyors. The metal is poured from a covered insulated drum type ladle suspended from a monorail. Fig. 2—Sand is packed in the flasks by a sandslinger with an exceptionally long cruising radius. Fig. 3—Molds are set up and cored on the center floor





wet blacking by an operator, who through constant practice has developed his skill to a point where the coat of blacking on the bottom of the mold and in the pockets, is no deeper than it is on the sides. After the mold is sprayed the operator goes over the entire surface with a camels hair brush dipped in a weak solution of molasses water and blacking. In contrast to the technique of former generations of dry sand and loam molders, the blacking is not slicked with the tools.

Molds are dried in a continuous type, oil fired oven. This tunnel type oven is approximately 52 feet in length, with an opening at each end 10 feet wide and 3 feet 6 inches high above the level of the conveyor. A flight conveyor which serves the full width of the oven extends approximately 12 feet beyond the ends to serve as loading and unloading stations respectively. Heat for the oven is supplied by a high speed oil fired heating system, designed to deliver maximum heat to the interior mold cavities and so far as practical to avoid heating the flasks. In effect the molds are elaborately skin dried to a depth of 1½ to 3 inches, depending on requirements.

The heating system is thermostatically controlled and is equipped with the latest design safety devices to protect the unit against hazard from fuel, flame or power failure. A cooling zone which immediately follows the heating zone is incorporated in the tunnel. This important feature is designed to reduce the temperature of the dried molds to an extent that will permit the immediate setting of cores in the molds as they leave the oven.

Entire cycle through the oven, including heating and cooling is approximately 3 hours for the large molds. A variable speed transmission permits faster operation of the conveyor for smaller molds.

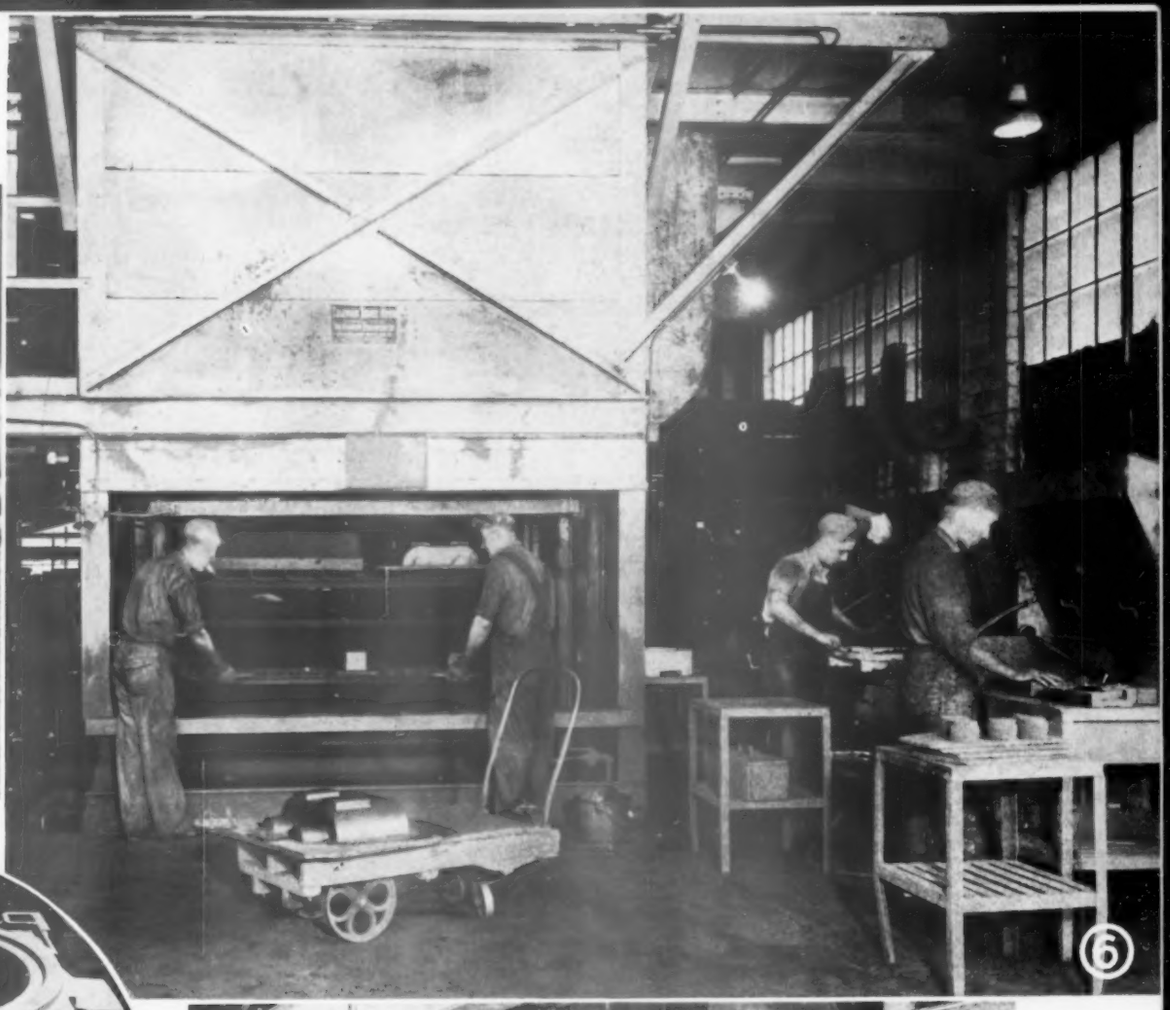
As may be noted in the accompanying illustrations the oven is not provided with a door at either end. Spillage of heat is prevented by air locks located at each end. A similar air lock separates the heating and cooling zones and prevents high temperature air from entering the cooling zone, or cooling air from entering the high temperature zone. Because of limited head room beneath the crane, the return pass of the conveyor is in a shallow pit below the floor level. Had sufficient clearance been available, the entire structure could have been located above the floor level.

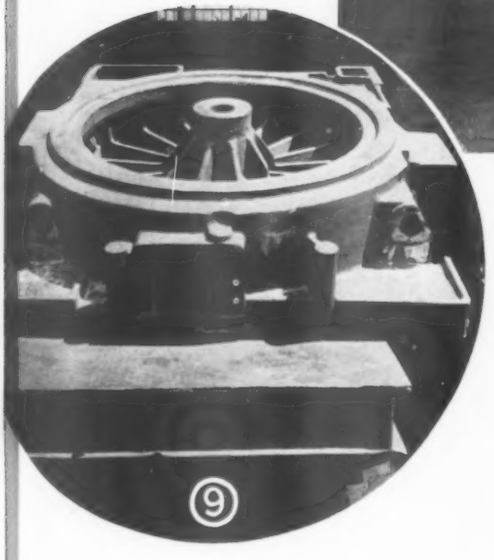
Advantages claimed for the method and equipment include thoroughly uniform drying since each portion of the mold cavity receives the same treatment as it moves through the oven; rapid turnover of the flask equipment; skin drying requires only about one fourth the time necessary for drying a mold all the way through; improved working conditions result from molds that are cooled and handled quickly. Marked economy is shown in fuel consumption and in labor.

Large dry sand cores on which the service of a crane is needed are made near the center and at one side of the main bay and are dried in a 20 x 20 foot car type oven heated by a unit. Small and medium weight cores are made in an extension to the side of building in the same vicinity. In addition to the usual benches, racks, etc., the core room is equipped with a vertical type oil fired oven and extending to a height of 45 feet above the floor and about 12 feet below the floor. At the floor level the cores are placed on swinging plates which carry them aloft through the baking zone, over the top and down the opposite side to be removed at the floor level opposite the point of entry.

Reclaimed core rods are stored in a number of bins. Incoming coreboxes are examined and serviced by an experienced man, before the coremaker begins operation. The servicing consists in selecting all the rods and hooks necessary and placing them in the box. Intimate familiarity with all the jobs enables one man to do this work much faster and much more reliably than a number of less skilled individuals attempting to make their own selections. Owing to the manner in which the cores are removed from the castings by a stream of water and sand under high pressure, the rods are recovered undistorted.

Core sand is prepared ac- (*Please turn to page* 160)





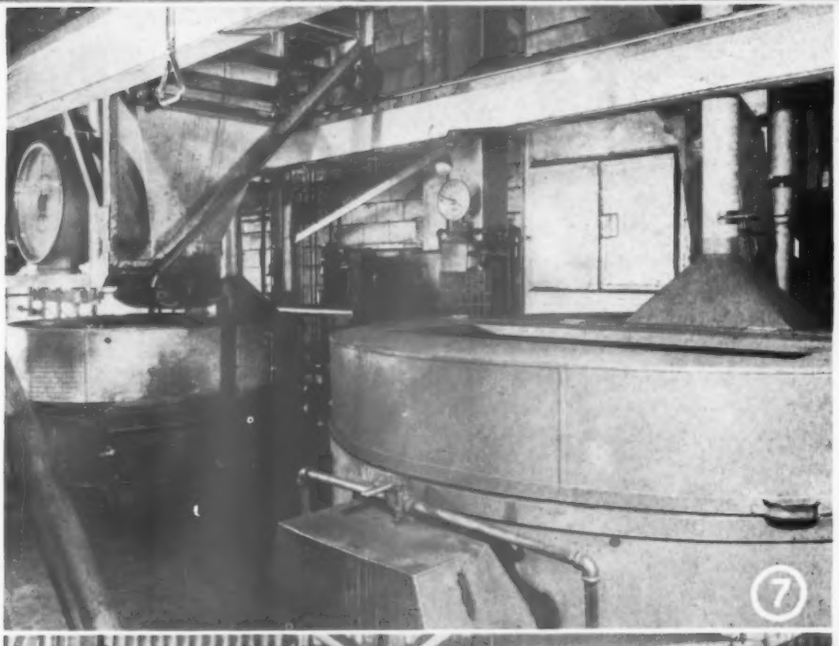


Fig. 4—Conveyor speed varies between 2 and 3 hours depending on the size of the mold. Fig. 5—Air seals divide the oven into zones of different temperatures. Fig. 6—Green cores are loaded at one side of a continuous type vertical oven and discharged baked on the opposite side. Fig. 7—Sand is prepared in two mullers, enclosed and automatically controlled. Fig. 8—Sand and water at high pressure remove sand from the castings. Fig. 9—Typical machine tool base casting cleaned and shipped

Pin Holes in Converter Steel Not Due to Cupola Metal

When using cupola iron to raise the carbon content of converter heats from 0.20 to 0.30 per cent carbon to 0.45 to 0.55 per cent, the resulting steel contains pin holes or gas holes which are not present with the lower carbon metal. Can you make any suggestions on the cause or how to eliminate the trouble?

It is impossible to state why pin holes should be encountered in steel recarburized with cupola metal without knowing more of the conditions in manufacturing the steel. In regular converter operation, it is the regular practice to raise the carbon to the desired point by proper additions of liquid cupola metal to the ladle, or to the metal in the converter before pouring it into the ladle (which generally is better practice), and no trouble is encountered with pin holes or gas holes if proper additions are made to the steel. In particular, aluminum has to be used in the higher carbon steel, the same as in low carbon metal.

Mention has been made that lower carbon steel in the same heat does not show the pin or gas holes. From that it might be inferred that part of the steel is made of lower carbon, and part transferred to a smaller ladle, and additions of cupola metal made to it. If the smaller ladle used for the high carbon steel is not dried properly, or has a wet lip, pin holes might be due to that cause. Again, the trouble may lie in the molds used for the high carbon steel—they may be vented improperly, of too tight a sand mix, or any one of a number of things. In any event, cupola metal has been used successfully so long for the purpose of raising carbon in converter steel that it is not probable its use is the sole cause of the trouble. We suggest that you increase your silicon content from the present 0.28 per cent to say 0.35 to 0.50 per cent.

Suggests Casting Solid Brass Sticks in Open Sand Molds

Our solid brass sticks in diameter from 1½ to 4 inches show spongy or porous where the gates are cut off. We melt ingot metal 85-5-5-5 with a small amount of scrap and the return from former heats. We shall appreciate advice on gates, risers and other items of practice necessary to secure clean, solid castings.

Three factors essential in the production of clean, solid sticks, or for that matter any type of casting, are clean metal, proper melting practice and good molding practice. Absence of any one will cancel the value of the other two. Your metal is satisfactory, therefore any defects that appear in the casting are due either to the melting or molding practice, or perhaps to a combination of both. In this instance the type of gates and risers is relatively unimportant. Metal may be introduced to the mold through practically any type of gate and in the majority of instances risers are unnecessary. Castings may be poured either horizontally or vertically, the smaller sizes, 6, 8 or 10 in a flask and the larger sizes singly or in pairs. Since one end of the stick merely serves as a grip end to hold it in the machine, it is immaterial whether or not this end is clean and flat. Therefore, the simplest method is to mold the sticks on end without a cope.

The metal is poured into the open top. Bring the metal up slowly for the last 2 or 3 inches and on the larger sizes touch it up once or twice. Cover the top with loose sand and the resulting castings will be clean and solid and you will have no gate or riser to remove. Sand must be open and permeable, rammed firmly around the bottom to prevent swells, and as dry as can be worked safely, that is between 4 and 5 per cent moisture. Do not crowd the molds in a flask. In the preliminary and experimental trials it may be advisable to use the vent wire and form a ring of vent holes around each mold. As an added precaution, particularly on the larger sizes, a rod heated in the ladle or crucible is inserted into the fluid casting and given a whirl or two to release and bring to the surface any entrapped foreign material. Proper melting practice presents too many phases for casual reference.

Iron and Brass Give Trouble Due to Melting

We operate a foundry in Honduras, and due to the inability to obtain coke we built oil-fired, rocking type, reverberatory furnaces for melting iron and brass. The iron furnace is 24 inches inside and 60 inches long while that for brass is 24 inches inside and 36 inches long. We use diesel fuel oil from a tank which provides a 2-foot gravity head and use compressed air at 65 pounds per square inch for atomization. The iron made from all machinery scrap is hard and shows slag when machining. It takes approximately 2 hours to melt 500 pounds. The brass made from scrap requires about 30 minutes to melt 350 pounds, but the metal shows cracks and numerous holes from the size of a bean down to pin points which we believe are due to gassing.

The descriptions of the results obtained in melting iron and brass indicate that the two furnaces are not operated alike since the one in which the iron is melted has a highly oxidizing atmosphere producing what is termed burnt iron, while the brass furnace has a reducing atmosphere resulting in gassed metal. You mention that you built your own furnace, and we wonder whether that might not have something to do with your troubles. Certain principles must be observed in furnace construction,

and unless you worked from plans supplied by experts in the combustion field, difficulties may be encountered.

Assuming that the furnaces are constructed properly, the trouble lies in the regulation of the burners. In the case of the iron it will be necessary to reduce the amount of secondary air supplied by the blower or increase the quantity of oil. Just the opposite is required in the case of the brass furnace. True condition of the furnace atmosphere only can be determined by analysis of the gases, and since you probably do not have the necessary equipment, you will have to judge the desired flame by eye. That will have to be gained by experience since it is difficult to describe the appearance of the flame except to say that a reducing flame usually is long, yellowish, and smokey while the oxidizing flame is short and reddish. Perhaps if you will observe the appearances of the flames in the two furnaces you will notice the similarities to the previous remarks on color, length, etc.

Gas Holes on Cope Side Spoil Light Aluminum Casting

We are forwarding an aluminum casting 8 inches diameter and 3/16-inch thick, with several small gas holes in the cope side. The metal is poured at a temperature of 1450 degrees Fahr. We have encountered this form of defect only since we have been melting a new shipment of metal. The castings are molded two in a flask with a central sprue and two small branch gates to each mold cavity.

Since this form of defect appeared only recently, and presumably without any change in your molding and melting practice, you might be inclined to place the blame on the metal. Of course a possibility exists that the metal may be responsible, but the possibility is remote. Manufacture of ingot metal, primary or secondary, is carried on under such exacting conditions and the metal has to conform to such rigid specifications, that the foundryman usually does not need to go that far when diagnosing a casting defect. The small holes in the cope face of the casting submitted for examination were formed by gas or air bubbles trapped in the metal at some stage between the melting furnace and the mold. In a thicker casting poured from a comparatively high head, these bubbles would have a chance to escape before the metal solidified.

In the present instance the thin film which always covers molten aluminum, became so dense the instant it touched the cope, that the bubble remained in captivity. From the appearance of the entire casting surface, it is apparent that the sand is entirely satisfactory. Therefore, the investigation narrows down to two possible factors. Transfer of metal from furnace to pouring ladle, or method of pouring into the mold. At some stage in this transfer a certain amount of air has been caught and held in the stream, to appear later as small cavities in the cope face of the casting. To avoid this, the metal stream should be fair and steady. At the mold the sprue should be filled rapidly and kept filled, with the ladle lip close to the sprue opening. Rough handling of skimmer or pyrometer may introduce air bubbles in the metal. Although temperature is not a factor in the present problem, 1350 degrees Fahr. should be high enough for pouring the castings.

Wants To Know How To Increase Carbon in Cupola Iron

Can you give us any information on how to raise our total carbon? It runs from 3.05 to 3.20 per cent, and we would like to have it between 3.30 to 3.40 per cent. We have a 54-inch cupola. Blast is supplied by a positive pressure blower controlled by an air-weigning unit. We blow 3800 cubic feet per minute at 8 to 12 ounces windbox pressure. Coke bed is 57 inches above tuyeres. Coke analyzes 90.25 per cent fixed carbon, 0.83 per cent volatile matter, 8.92 per cent ash, and 0.68 per cent sulphur. Iron and coke charges are weighed carefully—2000 pounds iron to 250 pounds coke. We use an all scrap mix and alloy with briquets and ferroalloys. Iron comes out hot 2700 to 2800 degrees Fahr. at the spout.

It is little puzzling to understand why low carbon is obtained under the operating conditions which you state. It is assumed that an "all scrap mixture" means all cast iron scrap and that steel scrap is not included. Aside from the great height of bed—which for most purposes is excessive and should not lower the carbon content—conditions appear normal for production of a 3.30—3.40 per cent carbon with silicon say 2.25 per cent. With a very high silicon charge—2.75 per cent—slightly lower carbon might be expected. Very high phosphorus lowers carbon.

If the silicon is 2.25 per cent or below, a probable source of the difficulty is the reactivity of the coke. Some cokes —usually softer ones—tend to give up more carbon to the iron. Such a coke and some high carbon pig iron would boost the carbon. In the first part of the heat higher carbon is attained with a deep well. An appreciable amount of carbon can be added to the molten metal in the ladle, through the medium of various materials advertised in The Foundry. Decreasing air input and melting rate tend to increase carbon content.

GANGWAY! By J. A. Patterson

"Shake hands with Mr. Snively—our electrical engineer."

Simplify Technique Of Chill Tests

Please send us a sketch of equipment used for making cast iron chill tests at frequent intervals during the heat. We are pouring iron which ranges between 2.30 and 2.40 per cent silicon, sulphur 0.12 per cent, phosphorus 0.50 to 0.55 per cent, manganese 0.50 to 0.60 per cent, total carbon 3.24 per cent. We make radiation castings in wide variety. We use a sharp wedge test made in a dry sand core, but this is not satisfactory and we are thinking of changing over to a test bar poured on a chill.

Since the purpose of your test is merely to keep a close check on the iron and to maintain uniform and homogenous quality from first to last of the heat, the size and shape of the test piece are items of only minor importance. The value of the test depends almost entirely on the experience and knowledge of the person making the test and reading the results.

You do not state why the wedge test is not satisfactory. It is used quite extensively, particularly where castings of various section thickness are poured from a common or base mixture. An interesting and highly practical type of chill test was described in the November, 1935 issue of THE FOUNDRY. It was designed to cover operations where iron of several classifications is melted in the one heat. The accompanying sketch shows a suggested simplified green sand, chill test layout. A stel rail section *A* or *B* or a cast iron block *C* or *D* may be used for a chill. It is set up horizontally on the floor near the furnace and the test blocks are molded by placing one or a number of wood patterns *E* and *F* in a vertical position as at *A* and *C*, or in a horizontal position as at *B* and *D*. The entire set of molds for the day may be made at one time, or a small number may be made first, and any necessary additional number made later. The pattern block is laid up against or on the chill and green sand is packed around it. In both cases the narrow ¾-inch edge of the pattern touches the chill. Obviously the working face of the chill must be kept clean and dry so that the metal will lie quietly in the mold.

Scabs Form on Flat Bronze Plates

We are having trouble casting bronze plates ranging in diameter from 18 to 30 inches and from 1 to 2¾ inches thick. Main trouble is scabbing which is not located in one specific area. We use No. 3 Albany sand and place gates and risers at 4 corners of the mold. Gates are 4 inches wide and as thick as the casting. Sprue and risers are 6 inches in diameter and 6 inches high, and casting is poured flat. Alloys used are 85-5-5-5 and 80-10-10.

Casting of uniformity thick, flat plate is one of the most trying problems the foundryman has to meet. Production of perfectly sound, clean, scabless castings of that type has given many a foundryman gray hair, and caused him to lay awake at night. Where the demand for perfection is sufficiently great to warrant the additional expense, it has been found advantageous to use dry sand molds, or to skin dry the molds carefully before pouring.

One of the most effective precautions against trouble in production of flat plates is to cast them on edge, or at least set them on an incline so that the metal enters at one side and fills the cavity evenly and uniformly without having a number of streams running helter skelter through the mold. That also permits pouring at a lower temperature. Scabbing is caused by steam getting behind the mold surface and blowing it loose so that careful ramming, gating and use of the lowest possible pouring temperature will aid in eliminating the trouble.

A good step in avoiding scabbing is to brush the mold surface with a thin solution of molasses water containing a good grade of graphite, silica flour or other refractory material. When that is used the mold must be dried to get rid of the excess moisture. In gating the point to keep in mind is to arrange the metal flow so that it does not all pass over one area of the surface. The latter procedure increases the sand temperature to a point where scabbing is engendered.

Your sand should give no trouble as it is the grade in common use for similar types of castings. Study your gating, and if the demand for a sufficiently high quality casting will permit the use of dry sand or skin dried molds, you will reduce the scabbing problem materially—and it is entirely possible that either will more than offset any increase in cost.

Duralumin Is Not a Casting Alloy

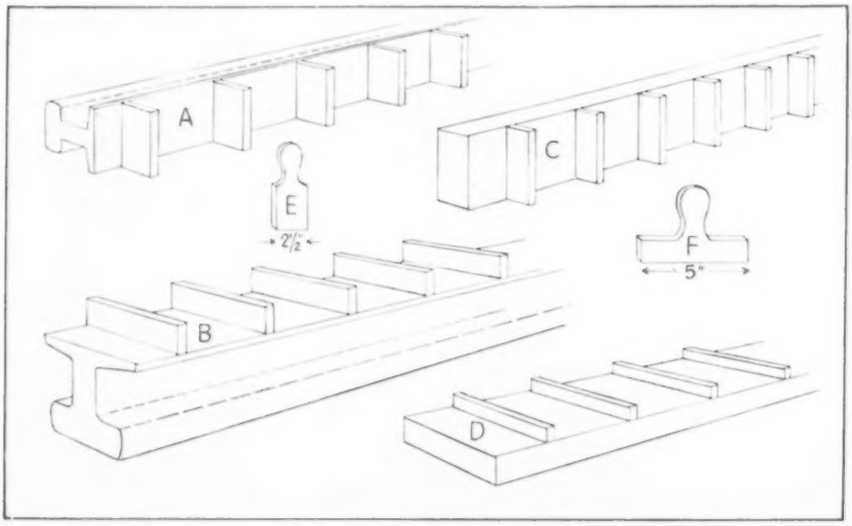
Where can we get information on the manufacture of duralumin, and where can we get a list showing the melting points of various metals?

The word duralumin refers to a series of wrought aluminum alloys developed in Europe almost two decades ago, and if it has any general metallurgical significance, may be assumed to indicate wrought alloys containing copper, magnesium and aluminum which harden spontaneously at room temperature after being cooled rapidly from about 930 degrees Fahr. A typical composition for duraluminum contains about 4 per cent copper, 0.5 per cent magnesium, 0.5 per cent manganese, and remainder aluminum.

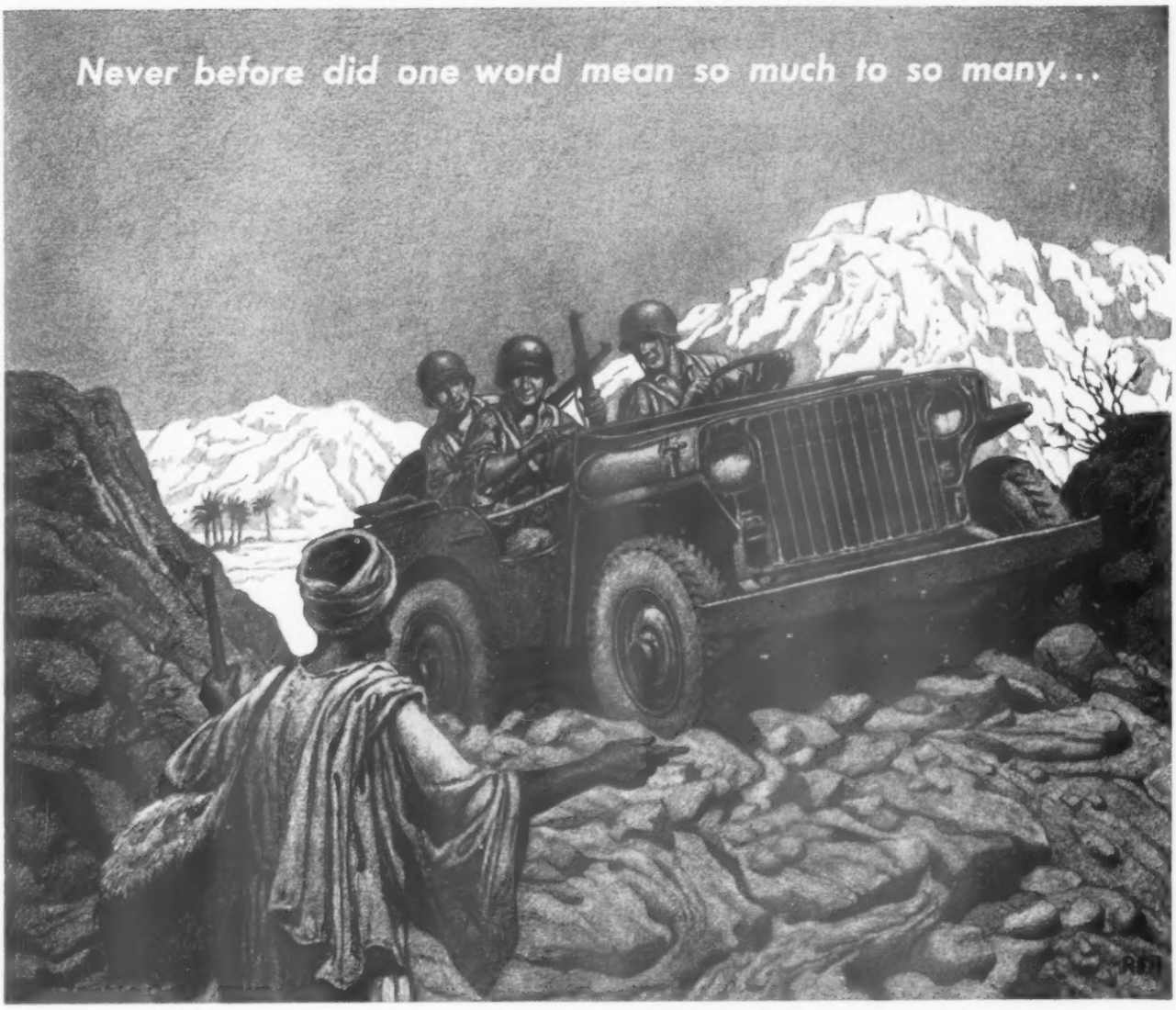
There are a number of aluminum alloys for castings which can be heat treated to provide enhanced physical properties. However, the compositions and heat treatments in general are proprietary procedures, and it is suggested that you consult with the producers for the necessary information relating to them.

Tables for the melting points of various metals may be found in a number of engineering handbooks, and you probably can find them in your public library for examination. Possibly the following list may serve your purpose: Aluminum, 1200 degrees Fahr.; antimony, 1138 degrees; bismuth, 520 degrees; brass, 1700 to 1850 degrees; bronze, 1675 degrees;

(*Concluded on page* 96)



Chill test pieces and method of making



You can serve by CONSERVING

Name a continent . . . and you've named an American battlefront. From Tunisia to Timor, from India to Iceland, Americans and their Allies face a need for more arms and equipment . . . more tanks and trucks, more planes and ships and guns.

And those modern weapons need alloy steels in vital parts. Nickel steels, for example, that provide extra toughness, strength and added resistance to shock and impact. No need to tell you how essential these qualities are to the equipment of our armed forces.

That's why it's so important to *conserve* critical alloys. Every possible pound must be saved for our fighting men.

The best way to help is by making sure all metal scrap in your plant is properly segregated. Collect ferrous and non-ferrous scrap, in separate containers, at the machines where generated.

High-speed tool steels and alloyed constructional steels should also be collected and salvaged separately. When in doubt . . . segregate!

If metal problems are bothering you—if you would like suggestions for extending your own metal conservation program—call on our technical staff for "CONSERVICE,"—a new name for counsel and data that will help you conserve.

* * **Nickel** * *

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

(*Continued from page* 94)

copper, 1980 degrees; cast iron, 2300 degrees; lead, 622 degrees; manganese, 2300 degrees; nickel, 2646 degrees; silver, 1760 degrees; steel, 2500 degrees; tin, 449 degrees, and zinc, 787 degrees Fahr.

Wants Information On Cost Figuring

We have a small manually operated foundry, and would like some information on figuring costs. We are interested particularly in the overhead expense in casting red brass, yellow brass, manganese bronze and aluminum.

We suggest that you refer to the cost system established for nonferrous foundries published in the September, 1934 issue of THE FOUNDRY. We believe that it is the most comprehenslve piece of cost work that has been done in the nonferrous industry, and it seems that you would do well to go over each article carefully. However, we would like to touch on a few points in that system which are not in line with the methods used in establishing cost systems for this industry.

Your attention is called to the paragraph on page 19 reading as follows; "The basis for depreciation shall be the original cost including freight and installation, except in the case of plant and equipment acquired at an abnormal price, the basis shall be the fair replacement value of such assets.

If your company has had a recent inventory of physical assets made by a reputable appraisal firm, the fair replacement value of these assets is at hand for the establishment of depreciation to be taken into cost. If you do not have those records, we suggest that before preparing any burden of distribution, that an inventory be taken and the inventory be priced item for item on what would have to be paid in the open market for assets of equal utility value.

At the bottom of page 19 on the article the author has recommended the establishment of normal based upon the best consecutive 6 months since Jan. 1, 1924. Owing to the fact that the best 6 months since that period might not represent the potential capacity of the company to produce castings, the establishment of normal on that basis is rather dangerous. We would suggest that you establish your normal based upon the capacity of the company to produce, less a reasonable number of hours' operation to allow for holidays and shutdowns.

A common basis for normal being used in quite a number of industries including some foundries, has been to consider the plant operating consecutively 40 hours a week for 50 weeks in the year. That produces a 2000-hour normal which under present manufacturing conditions in industry seems very fair. Of course it must be understood that there must be some balance between various departments. That is you must consider enough capacity for melting, coremaking, and cleaning to serve the molding department for all the molding capacity.

The suggested form of estimated cost of nonferrous castings shown on page 60 of the article, is a splendid form for estimating individual jobs, and its use is suggested.

The cost system under discussion which was prepared by the Nonferrous Foundry Industry Code Authority for use under N.R.A., may seem to be complicated. However, there is nothing about it that cannot be understood by the average operator if he will analyze every paragraph with the same amount of intelligence and concentration as he would with a blueprint covering an intricate casting.

If you sincerely are interested in having a cost system which will give material aid in knowing when to take an order and when to leave it alone, you will do well to give the article mentioned very serious consideration. If you do not have men in your organization who you feel, are capable of installing such a system, you would do well to make inquiry into the professional field and secure the services of some cost engineer who will be able to analyze your problem and establish a system along the lines as set forth in the article.

Requires Skill for Making Anodes

We will appreciate having detailed information on the method used for casting nickel anodes. Can you advise us on what additions are made to the nickel? The anodes will be used in a bright plating process.

Production of nickel anodes is a specialty, and those engaged in that work are reticent about revealing the details of procedure. Of course, the purer the nickel used, the better since any impurities present result in a sludge in the nickel plating solution, or at least a contamination from undesired materials. Most anodes are cast in permanent molds or semipermanent molds although some are cast in sand molds. Proper melting of the metal is vital which means intelligent control of the furnace, use of the right type of container for melting, use of proper deoxidizers, etc.

Some makers use magnesium for deoxidation while others object to its use. Some use finely ground charcoal to cover the molten metal, but others claim that such practice is definitely objectionable. Phosphorus is employed by some as a deoxidizer, but its use is hazardous and dangerous since it must be added in the elemental form and not as an alloy with tin or copper. Furthermore, just the right amount of deoxidizing agent must be used, or the finished product will not be satisfactory.

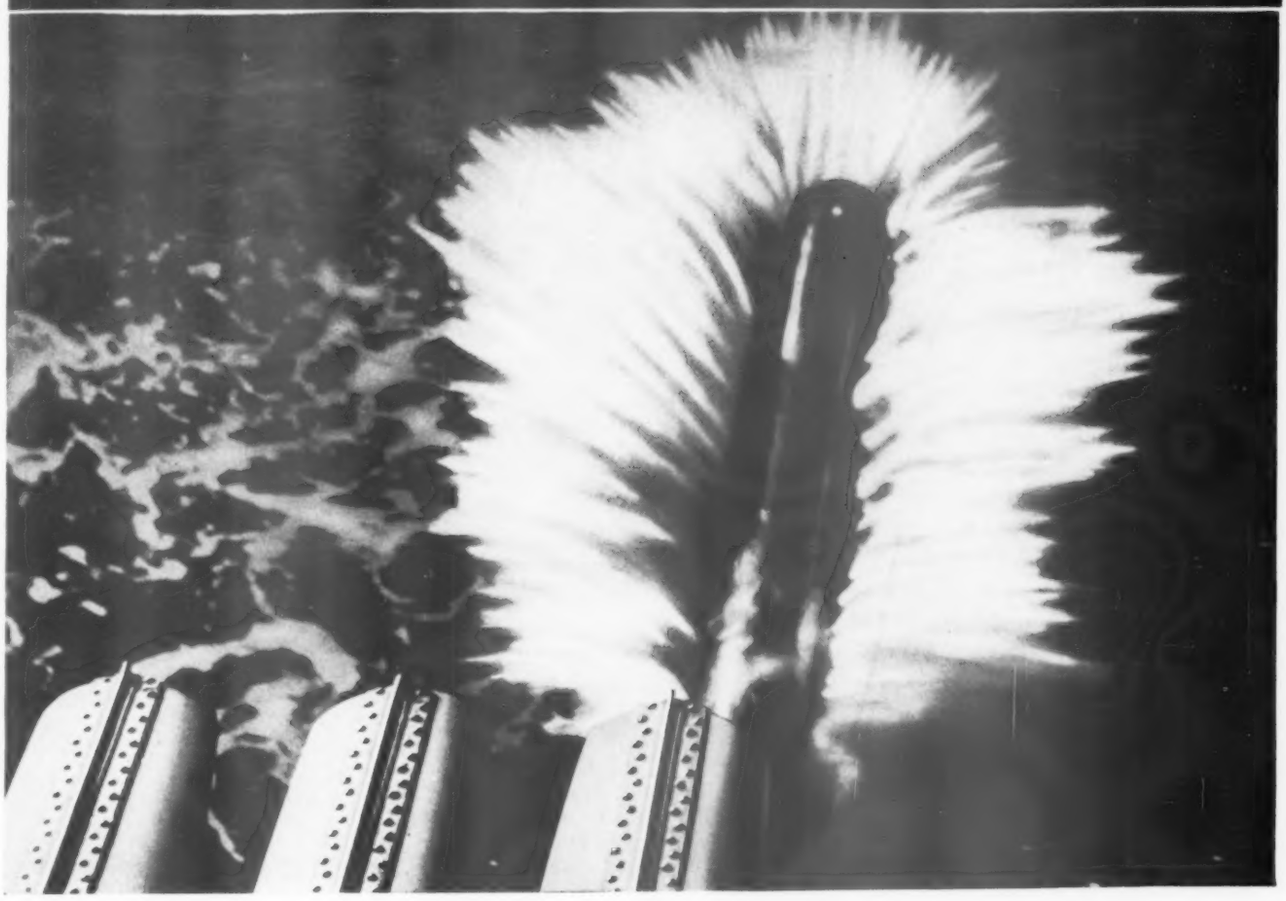
From those remarks it may be determined that production of nickel anodes is beset with many difficulties for the beginner. Incidentally, nickel is under priority regulations, and will be hard to secure. Its application is limited strictly to the war effort directly or indirectly, and none is available for any civilian purpose.

Melt Hot Iron in a Small Cupola

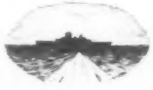
We have a small home made cupola 26 inches inside diameter, with four tuyeres flared at the mouth and 3½ x 9 inches at the wind belt which is 8 x 14 inches. The blast pipe 8 inches in diameter enters the wind belt on top at the back, or opposite the tapping spout. A positive pressure blower delivers 1200 cubic feet of air per minute. The coke bed extends 30 inches above the tuyeres. The first charge of iron is 700 pounds and subsequent charges are 400 pounds iron and 84 pounds coke. We are thinking of changing the blast pipe to a Y with nozzles entering the wind belt on top at two opposite sides. The cupola is satisfactory in many respects, but the iron is not as hot as we would like to have it. The wind belt has no volume or pressure gage.

Whether the blast enters the wind belt through one opening or two openings is not an important factor. Your 8-inch diameter blast pipe is smaller than usually employed on a 26-inch cupola, but that also is a comparatively minor factor, since the high pressure air has a chance to expand in the wind belt and in the flared tuyeres. Instead of speculating on the probable causes of dull iron in the present instance, it may be more to the point to indicate proper procedure. Place enough coke on the bed so that it extends 36 inches above the tuyeres after it has burned through and has settled down. Add a layer of coke 4 inches thick and commence charging 500 pounds iron broken into small pieces. This is followed by alternate charges of 60 pounds coke and 500 pounds iron with 20 pounds limestone on each charge. Best results are secured by letting the charge soak ½ to 1 hour before putting on the blast. Attention is directed to the fact that heavy patching, or a wet bottom, or both affects the temperature of the iron. A possibility exists that your coke is low in carbon content and will not produce hot iron.

A "TIN FISH" TAKES TO WATER



Buell Dust Recovery Systems helped produce it!



That "tin fish" (torpedo to landlubbers) is an intricate mechanism of more than 10,000 parts. Some of these parts are forged; others, like the propeller, are cast; but all must be machined and finished to the finest tolerances...and uncontrolled dust anywhere along the line might seriously impair accuracy. That is why Buell Dust Recovery Systems have so many uses in modern industry.

In foundries, for instance, Buell Dust Recovery Systems are used to control dust in conjunction with shake-outs and the grinding and rough finishing of castings. With machining operations, Buell equipment efficiently eliminates a hazardous nuisance. In many installations, Buell's big job is the recovery of critical materials that would otherwise be lost as dust.

Only Buell Dust Recovery Systems use the patented van Tongeren cyclone—an ingenious "shave-off" design that permits exceptionally high recovery efficiency at low operating cost. Buell cyclones have no moving parts and require practically no supervision because large openings prevent clogging. Buell equipment is built for long life and trouble-free service, and installations can be made to handle any gas capacity from 300 c.f.m. up.

Factual 28-page book. Write for Bulletin F-2.

Memo to
FOUNDRIES
Buell Dust Recovery Systems are widely used in connection with
SHAKE-OUTS
CRACK-OFFS
TUMBLING BARRELS
GRINDING AND BLAST FINISHING OPERATIONS
to reduce hazardous dust nuisances and to reclaim valuable material for re-use.

buell
DUST RECOVERY SYSTEMS

BUELL ENGINEERING COMPANY, INC.
14 Cedar Street, New York
Sales Representatives in Principal Cities

BUY WAR BONDS AND MAKE THE AXIS BITE THE DUST

men of industry

A. E. WINSTEAD, newly elected president, New Jersey Foundrymen's Association, has been identified with the foundry industry since 1929, and is connected with Moore Bros. Co., Elizabeth, N. J. Mr. Winstead first became associated with that company in an engineering capacity and now is serving as works manager. He was born in Callao, Va., 37 years ago and was graduated from Virginia Polytechnic Institute in chemical engineering in 1924. Soon after he joined the Standard Oil Co., in Bayway, N. J., in the engineering department and later became identified with Stanco Inc., a Standard Oil subsidiary, engaged in the production of special products. Subsequently he joined Moore Bros. Prior to his recent election, Mr. Winstead was vice president of the New Jersey Foundrymen's Association.

♦ ♦ ♦

Henry T. Riddick, Osborn Mfg. Co., Cleveland, has been named sales service manager of the company's brush division. Mr. Riddick continues as credit manager, which position he has held for many years. In his new duties he succeeds **L. J. Bechold** who resigned recently. Mr. Riddick has been associated with the Osborn company for a period of 32 years.

♦ ♦ ♦

B. P. Spann, for the past 8 years advertising manager, Gardner-Denver Co., Quincy, Ill., has received a commission as lieutenant in the supply corps of the United States Naval Reserve and has been stationed in Philadelphia. Lieut. Spann is on leave of absence from the Gardner-Denver Co. for the duration.

Washington Office of the Gray Iron Founders' Society has been moved to Rooms 302 and 303, 1341 Connecticut Avenue, N. W., Washington. The new telephone number is Columbia 7220. All gray iron foundry executives will be welcome at the new headquarters at all times

♦ ♦ ♦

Robert H. McKean, formerly chemist and metallurgist, National Malleable & Steel Castings Co., Sharon, Pa., has become assistant metallurgist, Frankford Arsenal, Philadelphia.

♦ ♦ ♦

Col. John C. Minor, manager of cylinder sales, Taylor-Wharton Iron & Steel Co., New York, has been granted a leave-of-absence to accept the appointment as consultant on gas cylinders, War Production Board, Washington. Col. Minor has been manager of cylinder sales for the Taylor-Wharton company for 14 years. During the last war he was a major in the Ordnance department, U. S. Army, and at present is a colonel in the Army Chemical Warfare Service Reserves. He is a former president of the Compressed Gas Manufacturers Association.

♦ ♦ ♦

Robert A. Murdock has been appointed service engineer, Claud S. Gordon Co., Chicago. Mr. Murdock's headquarters will be at the company's Indianapolis office.

♦ ♦ ♦

Keith Williams, vice president and general manager, Pratt & Letchworth Co. Inc., Buffalo, has been elected president to succeed **C. E. Swank,** who remains a member of the board of directors.

♦ ♦ ♦

Roger W. Allen, for the past 6 years dilstrict sales engineer, Foxboro Co., Atlanta, Ga., has been appointed Southeastern district manager, Wheelco Instrument Co., Chicago. He will make his headquarters at Atlanta.

♦ ♦ ♦

B. C. Heacock, chairman of the executive committee, Caterpillar Tractor Co., Peoria, Ill., has been appointed director, Priorities Control Division, Distribution Bureau, WPB. The division will be responsible for integrating the Production Requirements Plan, and the priorities system as a whole, with the Controlled Materials Plan. Mr. Heacock was born in Emporia, Kans. He joined the C. L. Tractor Co., San Leandro, Calif., as auditor in 1919. When the Best company and the Holt Mfg. Co. merged in 1925

(*Concluded on page* 100)

Henry T. Riddick

B. P. Spann

A. E. Winstead

Around the Clock

24 Hours Daily

Around the Calendar

365 Days Last Year

. . . and as long as future war needs demand

Woodward Iron Company

. . . will maintain production at peak capacity

. . . and maintain that uniformity in quality for which Woodward Iron is so widely known and which today is more important than ever before.

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

America's Largest Completely Integrated and Entirely Independent Merchant Iron Producer

(*Concluded from page* 98)

to become the Caterpillar Tractor Co., Mr. Heacock became secretary of the new corporation and was elected president in 1930, a post which he held until last fall when he became chairman of the executive committee.

♦ ♦ ♦

P. H. Brotzman, formerly assistant metallurgist, American Fork & Hoe Co., has accepted the position of chief metallurgist, Parker Appliance Co., Cleveland.

♦ ♦ ♦

David W. Hopkins, secretary and director, R-S Products Corp., Philadelphia, has been elected vice president of the organization. Mr. Hopkins will continue in charge of the valve division.

♦ ♦ ♦

H. W. Hem has joined the Howe Scale Co., Rutland, Vt., as research director. Mr. Hem was born in Kansas City and received his technical training at Findlay College of Engineering.

♦ ♦ ♦

Stephen D. Ransburg, recently has resigned his position with the Cooper-Bessemer Corp., Mt. Vernon, O., to continue his studies in chemical and metallurgical engineering at Tri-State College, Angola, Ind.

♦ ♦ ♦

Frederick J. Dunkerley, a graduate of Thiel College and Carnegie Institute of Technology, has been appointed to the research staff, Battelle Memorial Institute, Columbus, O.

♦ ♦ ♦

Welton J. Crook, on leave of absence as professor of metallurgy, Stanford University, has been promoted to colonel, Ordnance department, and assigned as technical officer and officer in charge, Steel Foundry Division, Rock Island Arsenal, Rock Island, Ill.

♦ ♦ ♦

Thomas Cook, formerly factory manager of McKinnon Industries, St. Catherines, Ont., has been appointed president and general manager. Mr. Cook succeeds **William A. Wecker** who has become vice president and general manager, General Motors of Canada.

♦ ♦ ♦

Brig. Gen. Donald Armstrong, chief, Army Tank and Automobile Center, Detroit, since last September, and prior to that, chief, Chicago Ordnance District, has been appointed commanding general, Ordnance Replacement Training Center, Aberdeen, Md.

♦ ♦ ♦

Leonard Schad for many years foundry superintendent Hesse-Ersted Iron Works, Inc., Portland, Ore., now is connected in a similar capacity with the Montag Stove & Furnace Co., Portland, where a large part of the capacity of the plant has been converted to the production of machinery castings for defense work.

♦ ♦ ♦

A. B. Norton, manager, Castings Division, Aluminum Co. of America, has been transferred to Pittsburgh, where the headquarters of that division will be located. **Harold C. Erskine,** manager of the Aluminum company's Fairfield-Bridgeport, Conn., plants has been transferred to Cleveland as manager of the Cleveland works.

♦ ♦ ♦

Lieut. Col. John Slezak, chief of the industrial division, Chicago Ordnance District, has been appointed deputy chief of the district. Col. Slezak has been connected with the ordnance reserve since 1924 when he was commissioned a second lieutenant. When called to active duty with the Chicago Ordnance District, he was president, Turner Brass Works, Sycamore, Ill.

♦ ♦ ♦

John Nuveen Jr., regional conservation director, War Production Board, Chicago, has been appointed chief deputy director of WPB for Illinois, Indiana, Wisconsin and Iowa. Mr. Nuveen succeeds **Andrew T. Kearney,** who recently became regional chief of WPB following the resignation of **Joseph L. Overlock** who returned to private industry. **William E. Simons,** head of the general salvage section, succeeds Mr. Nuveen as regional conservation director.

Gray Iron Society Aids WMC

At the invitation of the War Manpower Commission and the Selective Service authorities, the Gray Iron Founders' Society is co-operating to effect a plan whereby the necessary withdrawals from the gray iron foundries can be achieved in a more orderly manner with a minimum of distress to the foundries.

The Gray Iron Founders' Society appointed a committee consisting of B. D. Claffey, manager, Gray Iron Division of the General Mallcable Corp. of Waukesha, Wis., as chairman. Representing the heavy foundries on this committee are C. B. Magrath, president, Greenlee Foundry Co. and Northwestern Foundry Co., Chicago, and Norris H. Schwenk, vice president, Baldwin Locomotive Works, Philadelphia. The light foundries are represented by C. R. Culling, president, Carondelet Foundry Co., St. Louis, and E. B. Sherwin, president, Chicago Hardware Foundry Co., North Chicago, Ill. The committee met at the Palmer House, Chicago on Wednesday, Jan. 13 and were joined by the president of the society, A. C. Denison, president, Fulton Foundry & Machine Co., Cleveland, and A. J. Edgar, technical advisor of the Gray Iron Founders' Society. This committee will present its report and recommendations to the government and the board of directors of the society.

Prior to the meeting, the Gray Iron Founders' Society canvassed its members by questionnaire to determine the average maxima and minima of hours required to train candidates for the various jobs in the industry, such jobs and their names and definitions having been previously agreed upon by the society in conference with the government authorities.

It is well to note that operation under the proposed Manpower Plan will be entirely optional and only those considered qualified permitted to do so should they so desire.

Honor Conferred on Cooper-Bessemer

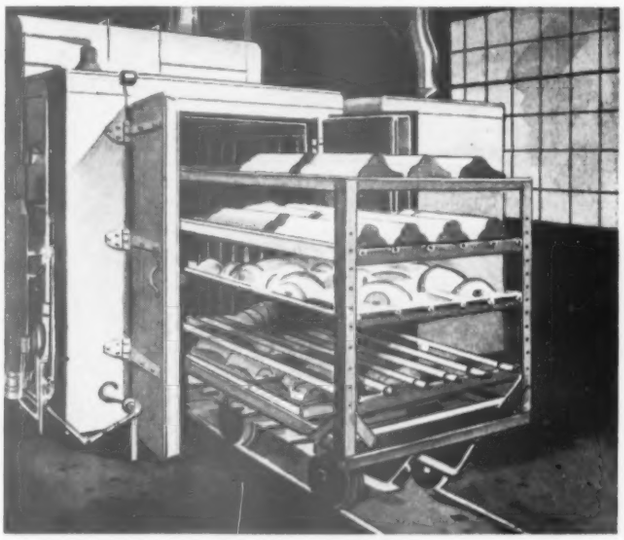
Recently plants of the Cooper-Bessemer Corp., in Mt. Vernon, O., and Grove City, Pa., participated simultaneously in a ceremony where Admiral Vickery, United States Maritime Commission presented the Maritime *M*, and the Victory Fleet Flag to the corporation, and a maritime merit badge to each employe. Lieutenant Governor Paul M. Herbert of Ohio delivered an address in which high tribute was paid outstanding production achievement. The Grove City plant has been supplying diesel engines at record rate for cargo vessels. The Mt. Vernon plant has established similar records in the production of cylinders, pistons, cylinder heads, studs and other equally important engine parts for Liberty ships.

"To further help this great program," said B. B. Williams, Cooper-Bessemer president, "we have freely shared our methods. Representatives of at least a dozen foundries throughout the country have visited us to learn our technique in handling the difficult and complicated jobs involved in our maritime production. We have done our best to give all possible assistance in every instance, and will continue to do so until victory is won".

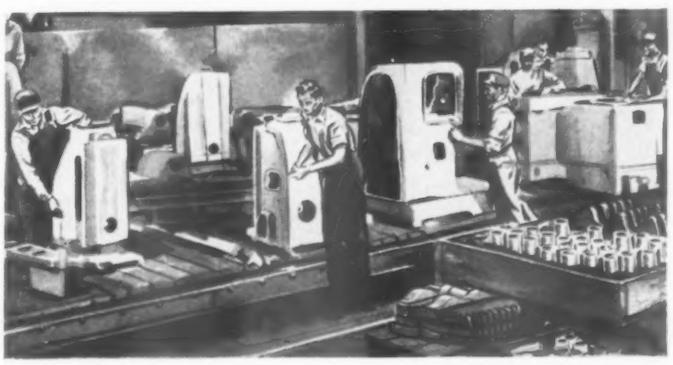
L. F. Williams, assistant secretary of the corporation, acted as master of ceremonies at Grove City and relayed details by direct wire to loud speakers set up in the Mt. Vernon plant.

SAVE TIME *up to 50%*
with Truline Binder

IN CORE ROOM . . . Truline Binder mixes readily with green, dry, or reclaimed sand. Core mixes flow readily, ram quickly, thus enabling your core makers to turn out *more cores per hour.*



IN BAKE OVEN . . . Because it fuses, then hardens, Truline forms a strong bond at comparatively low temperatures, bakes faster than do slow-baking binders which must be oxidized. *Consequently baking time is sharply cut.*



IN CLEANING ROOM . . . Because Truline burns out readily, the core collapses and disintegrates, making it easier to knock out the core sand. This saves cleaning time—*eliminates one* common bottleneck!

GET MORE *OKAY* CASTINGS

And here's another Truline advantage . . . *especially to foundries turning out high-shrinkage, non-ferrous castings!* Because Truline-bonded cores collapse readily, metal contraction is not hindered, hot tears are minimized. Rejects are, therefore, kept low . . . and production boosted.

For further information or a sample, fill in the coupon below. No obligation.

TRULINE BINDER

HERCULES POWDER COMPANY
INCORPORATED
999 Market St., Wilmington, Delaware

Please send ☐ sample ☐ information on how to use Truline Binder in casting:
(state type of work and kind of metal cast)

Name _____ Title _____ State _____
Company _____ City _____
Address _____
J.J-59

among Detroit foundries

BY A.H. ALLEN
Detroit Editor,
The Foundry

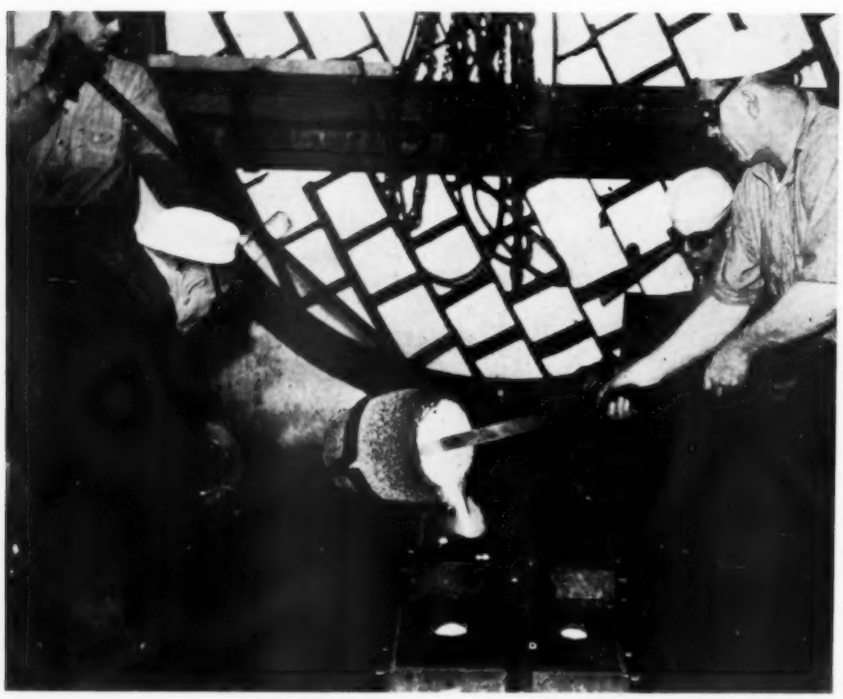
Gray iron replaces aluminum in tank engine. . . Standardizing accessories for mobile ordnance . . . Packard converts foundry to aluminum to supply Rolls-Royce castings. . . Postwar revolution in manufacturing methods seen

THROUGH its Tank-Automotive Center in Detroit, Army Ordnance has announced that it plans to standardize on one type of engine for the bulk of the medium tanks to be produced this year. Brig. Gen. A. R. Glancy did not say which of the several engines now being built it would be, but he did make plain that the one engine would not be used in all medium tanks —just most of them.

This news was followed by the revelation that Ordnance was moving to standardize even further on equipment and accessories going into all types of military vehicles, including tanks, trucks, self-propelled guns and the like. At present there are as many as 12 or 14 types of equipment such as generators, distributors, starter motors, batteries, etc., being used on different makes of vehicles. Naturally this makes the job of field servicing a tremendous one, and it is in the interest of simplifying service that the accessory standardization is being pushed.

However, it is a ticklish problem, for it means that some builders will have to abandon regular types of accessories in favor of the standardized model, which will mean in turn that suppliers of these parts either will have to shut down on manufacture in some cases, or retool for the standardized product, probably the latter. The matter of patents and financial agreements enters prominently into the picture, and the knotty task of compromising these conflicting elements is anything but simple.

To return to the tank engine—the wiseacres have been saying right along that the Ford 8-cylinder engine, developed originally as a twelve for aircraft use, would get the nod for tanks, since some months ago Ford officials indicated they could build all these engines the army would need in the Lincoln plant in Detroit. Production is now under way there, and the engines are being turned out at a rate of better than a hundred a week. As first designed this engine had an aluminum cylinder block and required in all about 700 pounds of aluminum castings and forgings. Reportedly a redesign has been worked out to permit substituting gray iron for aluminum in the cylinder block of the engine for tank usage.



Pouring nonferrous castings on board one of the U. S. Navy repair ships. Official U. S. Navy photograph

Convert Gray Iron Foundry

Newest aluminum foundry to come into production in this area is Packard's converted gray iron foundry which is now moving fast toward a production goal of around 30,000 pounds of finished castings a day. The go-ahead was given this project late in the summer, after the Packard foundry staff had been biting its nails for several months wondering what they were going to do following the suspension of gray iron production a year ago. When Packard was requested to set up facilities for doubling production of Rolls-Royce aircraft engines late last year, it became apparent that vastly expanded aluminum castings production would be required. So, without any too great an upheaval the gray iron shop was revamped completely for aluminum and is now undertaking the casting of about 30 different parts for the Rolls-Royce, ranging from small parts up to large sections weighing 87 pounds.

Even the new Packard foundry facilities will not be sufficient to handle the expanded Rolls-Royce project, so company officials are scouring the list of subcontractors to find more suppliers of castings. One midwestern plant is now understood to have approved plans for converting its gray iron foundry to aluminum, production being set at around 50,000 pounds daily. In addition, Packard has three other outside sources for

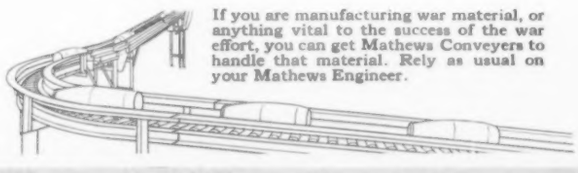
(*Concluded on page* 104)

TICKETED FOR *Tokio*

TOJO'S Day of Reckoning is coming and Mathews Engineers are working with Plant Engineers to speed that day.

Night and day . . . month after month, Mathews Conveyers are moving an endless procession of bombs, shells, cartridge cases, and vital plane parts, many of them destined to make it warm in Tokio.

If your production depends on precision movement of materials and supplies, a Mathews Time-Coordinated Conveyer System is a sure means of speeding operations all along the line. A Mathews Engineer will gladly consult with you on your problem.



If you are manufacturing war material, or anything vital to the success of the war effort, you can get Mathews Conveyers to handle that material. Rely as usual on your Mathews Engineer.

MATHEWS CONVEYER COMPANY ELLWOOD CITY PENNSYLVANIA

(*Concluded from page* 102)

aluminum castings, and patterns are being exchanged with these sources, so that there will be considerable duplication of castings by all foundries, including Packard's own.

The Packard foundry also will supply a number of castings used in the Packard marine engine, three of which are used to power the famous PT torpedo boat of the navy. This engine in many respects closely resembles the Rolls-Royce aircraft engine. Size, cost, and method of construction are surprisingly similar.

They are telling an amusing yarn about a new magnesium casting plant which was supposed to be getting under way at a downriver location, to supply a new type of cast magnesium bomber wheel for an outstate wheel builder. A few sample wheels were cast and assembled for tests. Everything seemed to be moving along smoothly and plans were being rushed for a huge plant to produce unlimited quantities of these wheels. As the project moved closer to the production stage, it appeared that some difficulties were going to be bumped into in getting supplies of alloy steel bolts to assemble the wheels. The design was a composite construction which required these bolts in assembly. A request for allocation of alloy steel from the WPB brought no more than a hollow laugh from the latter organization which was hard pressed to find enough steel for companies already in production. Further studies developed the fact that the composite wheel weighed more than conventional types of magnesium wheels, and the result was that the whole project was dropped and now is just a memory.

Important developments are being hinted at in the centrifugal casting field. Success which Ford has had in centrifugal casting steel parts for airplane engines and landing gear has been outlined in these pages, but reportedly the development is going much further and will bring other castings sources into the picture. There is a rather bad bottleneck, for example, in obtaining forgings for cylinder barrels required for both radial and in-line aviation engines. It may be possible to relieve this stricture by turning to centrifugally cast steel barrels which not only require less alloy steel to produce but can be made in far less costly type of equipment.

It is of interest to attempt to relate the many developments in techniques, processes and equipment, resulting from intensified war production, to the postwar automobile. Much thinking is being directed along this channel, but little active work because of the pressure of war production.

It seems to be agreed among top automotive officials that the initial postwar car will be a virtual duplication of the last of the 1942's because of the necessity for early resumption of production when the war terminates. But after that, in the words of George T. Christopher, president of Packard, "it's anybody's guess." One thing is becoming more and more certain: The revolution of the postwar period in automobiles will not be so much in the product itself but rather in the "way" of manufacturing the product. Engineers are learning a lot these days about new methods of tooling, new heat treatments, new precision machining techniques, etc. They know that these methods make a superior product, but they likewise realize that the costs involved are utterly ridiculous when applied to automotive manufacturing methods. The problem then is how to fit today's precision methods into the cost limitations of tomorrow's automobile. No solution has appeared as yet, but there is every confidence that the job can be licked somehow.

Certainly foundrymen will be called upon to do their share, and one of the first contributions which seems likely will be the application of the knowledge which automotive foundrymen are gaining in the casting of aluminum and magnesium to the postwar car—not the immediate postwar car but the car which appears when war manufacturing methods have had a chance to be digested in the postwar production era.

If the intense interest in aluminum and magnesium casting techniques currently being manifested in such gatherings as the monthly meetings of the Detroit Chapter of the A.F.A. is any gage, then the motor world is in for some far-reaching steps into the light metals field.

"E" Pennant Awarded to Optical Concern

American Optical Co., Southbridge, Mass., and its 9662 employes have been presented the Army-Navy "E" award for outstanding achievement in war production. The pennant was presented by Brig. Gen. Burton O. Lewis, district chief, Boston Ordnance Division. Capt. J. J. Hyland, U. S. Navy (Ret.), inspector of navy material, Boston District, who represented the Navy, presented "E" pins to the workers. George B. Wells, president accepted the award for the company and Bernard F. Fox acknowledged the lapel insignias on behalf of his fellow workers. Congratulatory addresses were made by Gov. Leverett Saltonstall of Massachusetts; Ira Mosher, vice president and general manager, of the company, and officials of various branches of the armed services. Roy F. Williams, general manager, Associated Industries of Massachusetts, served as master of ceremonies

New Steel Foundry In Operation

The new six million dollar government-built foundry of the Continental Roll & Steel Foundry Co., East Chicago, Ind., was placed in operation at midnight, Dec. 31, 1942, with pouring of the first steel. Construction of the plant, to produce turrets for tanks, was started 8 months ago. Tapping of the first heat was witnessed by officers of the Chicago Ordnance District, government officials and company executives. Representing the company were J. T. Osler, president and chairman; H. A. Forsberg, general superintendent; and Herbert Miller, superintendent of the plant.

The CORE OIL DOCTOR

Devoted to new ideas and case study reports on core room practice

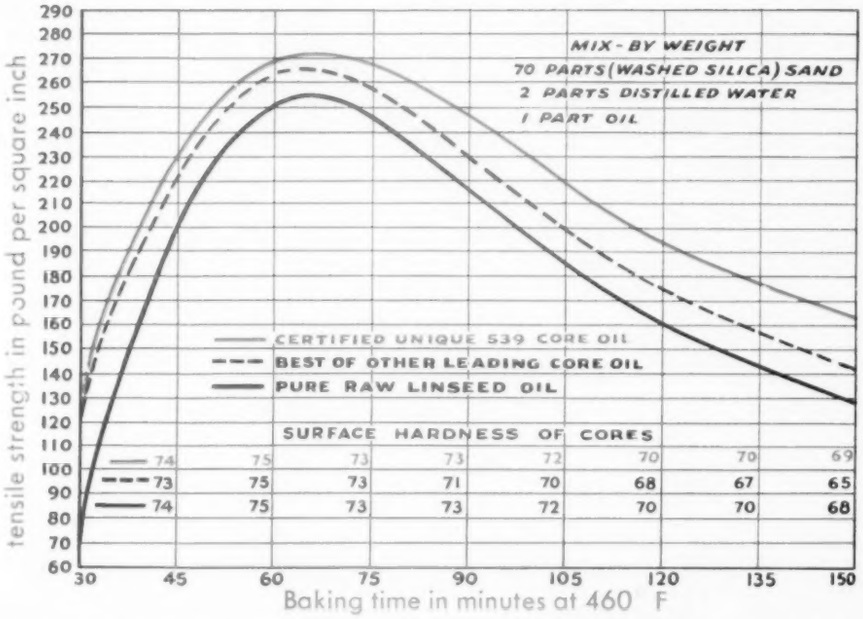
Published Monthly, Volume 2, Number 2, February, 1943

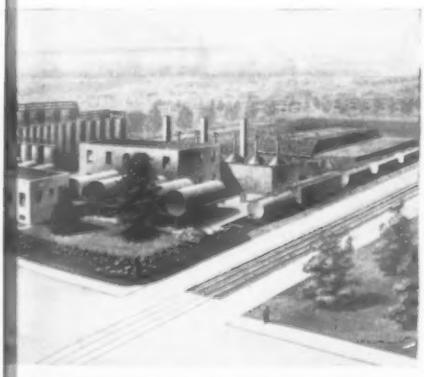
Certified Core Oils for All Types of Aircraft Castings

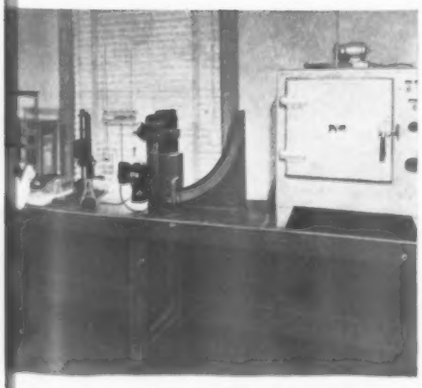
...MAGNESIUM, ALUMINUM OR ANY OTHER METAL

Here's the Proof!

Comparative laboratory test of Certified Unique 539 core oil *vs.* the best competitive core oil *and* pure raw linseed oil used in the production of all types of aircraft castings.







Above: Our 350,000-gallon plant. Below: Part of our Testing Laboratory.

There Is No Shortage of the Materials We Use

As the first manufacturer to use "Polymers" (by-product of cracked gas) in core oils, we discontinued its use many years ago because it caused excessive sticking in core boxes, crusting too quickly when mixed with sand and left on core benches and because coremakers objected to the tar odor. Having for years used other materials, we will not have to change any of our core oil formulae because of the probable shortage of "Polymers"—the cracked gas by-product.

All Certified Core Oil shipped on the understanding that it is as represented, must give complete satisfaction and run strictly uniform in quality or be returned for full credit. TRY A FEW DRUMS.

Certified Core Oil Characteristics

- **WORKS SMOOTHLY IN BOXES**
  More Contented Workers
- **RAPID COLLAPSIBILITY**
  Lower Cleaning Costs
- **ELIMINATES "BURN-IN"**
  Lower Cleaning Costs
- **STRICTLY UNIFORM QUALITY**
  See Guarantee at Left
- **NO OBNOXIOUS ODORS**
  In Core Room or Foundry
- **MINIMUM GAS IN MOLDS**
  Fewer "Blows"
- **COSTS LESS PER GALLON**
  Reducing Core Costs
- **LESS CRUSTING OF MIX**
  Regardless of Climate

CERTIFIED CORE OIL & MFG. CO.

"The House of Dependability"

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the adventures of Bill

BY PAT DWYER

Drawings By RICHEY

HAVE you any idea," I asked Bill one night recently, "what becomes of the family Christmas tree after it has served its purpose? At one time or another I have seen references to the millions of young trees nipped out of the northern forests, of the thousands of railroad cars and trucks employed in transporting these emblems of Christmas to towns and cities all over the country. Now it stands to reason that whatever goes up must come down. Following the same close line of reasoning, some disposal must be made of the trees after they shed their needles all over the floor and after the lights and the ornaments—the few that are not broken—are removed and packed away in the attic with a species of child like faith that they will be there when Christmas rolls around again. The trees do not vanish into thin air. Where and how do they go?"

"Pon my word," said Bill, "you can think of more useless subjects on which to ask questions than these here now Washington bureaucrats—perhaps that should be spelled burro—well anyway, these complacent birds who keep a manufacturer filling in questionnaires when he should be, and would prefer to be hammering out swords and spears on the ringing anvil of war.

"Better keep that Christmas tree idea under your hat. If a hint of your curiosity reaches Washington, a bureau with chief, assistant chief, technical expert, co-ordinator and liaison member, will be set up to compose a questionnaire on this vital and important subject. District offices will be established in every community to compile lists of past, present and future users of trees. Typical questions to be answered fully and truthfully under penalty of $10,000 fine or 5 years at hard labor in a duly qualified federal penitentiary will include: Name and Social Security number; place and date of birth; names of parents if any; where were you Aug. 5, 1922; number (approximate) of times in jail; troubled with falling hair, arches or dandruff; how about the teeth; hiya doc; what do you think of Willkie, Eleanor, Mahatma Gandi (Answer yes or no); have you, did you or will you own a Christmas tree this year, last year or next year; how did you get it, cash, installment, trade in or lend lease; height, width, number of branches and (approximate) number of needles on each branch; set up on stand, tub, table, bar, or well—just set up; do you keep a dog?"

"And a very good day to you, Willie," I said, "but that is not the question before the house. The question before the house, if my memory is still clicking as usual on all 16 cylinders, is, what becomes of all the old Christmas trees?"

"A fair question, as questions go. No person would be more delighted than I—or me—take your choice—to give you a fair and civil answer, if I knew the answer. I have not the faintest idea of what became of last year's Christmas trees, but I can tell you what happened to the trees that glistened so bravely for a week or two recently, or to put it precisely, in the Christmas season of the late departed 1942."

"You interest me deeply, my good man. I am all ears."

"Well," said Bill, "I would not exactly say that, but I am willing to admit that you were not hiding behind the door or under the bed when the good fairy was handing out these flapping appendages. Stretch 'em up now and listen.

"After the tree was stripped of the star, the lights dead and alive, the gimcracks, hickeys, gimmicks and doodads, the man of the house was told to drag it outside. No specific place was mentioned. Just outside. Goodness knows the other seven eighths of the partnership had enough to do cleaning up the mess and setting the house to rights, without having to tell the poor beast of burden what, when, how and where to do everything. Just get it out and mind the drapes and don't come back tracking mud and snow over the clean kitchen linoleum.

"This year the man dragged the tree outside and threw it on top of a pile of tin cans, old hats, shoes, and other flotsam and jetsam in the fond hope that in a day or two a truck would come around and haul the mess away to a blast furnace where the accumulation would be converted into a tank or a gun, or a battleship or something. Sentimental old ladies of both sexes would gaze on these piles of junk in the back yards and reflect with mixed emotions on the fact that the trees recently erected to commemorate the birth of the Prince of Peace, would soon—according to the newspapers—be spreading death and destruction on land, sea and air on people who apparently cannot be taught a lesson in any other manner."

"Your levity," I pointed out coldly, "is ill timed. Am I to understand that you are opposed to the collection of junk?"

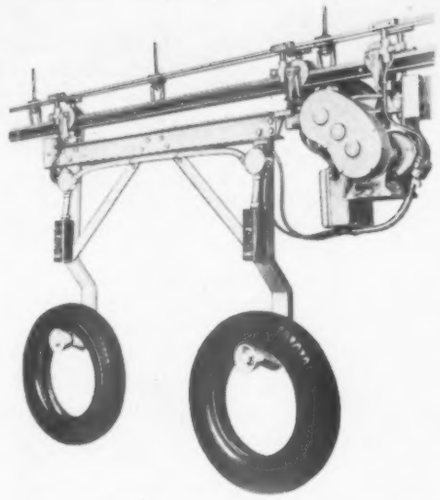
"Certainly not. The motive at the bottom of the scrap collecting campaign is excellent. All scrap material is junk and all junk can be utilized in some manner. However, all junk is not metal and most assuredly steel is not made in a blast furnace. The press exerts immense influence, but it would exert more if it exercised more discrimination in the selection and presentation of news, or—not to put too fine a point on it—mixed a little more meat among the garbage.

"I almost burn up every time I read one of these thrilling appeals in the press to gather up all the household scrap. Not at the direct appeal itself, but at the information thrown in gratuitously that the blast furnaces are howling for the stuff and that the brawny steel puddlers who work the blast furnaces are howling even more loudly because they can work their furnaces only half time."

Clearly, with the echoes of the bells still ringing peace on earth and all that kind of thing, this was a time for all good men to rally around and pour a

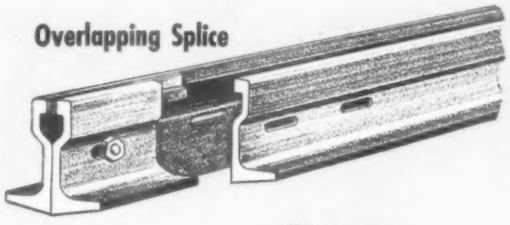
(*Continued on page* 108)

Just another end of a perfect day

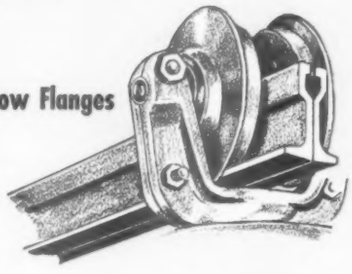


Flexible application of standard parts results in tailor-made systems without extra cost.

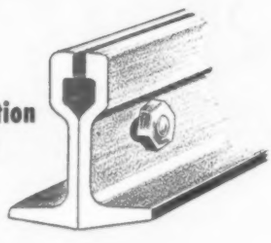
Overlapping Splice



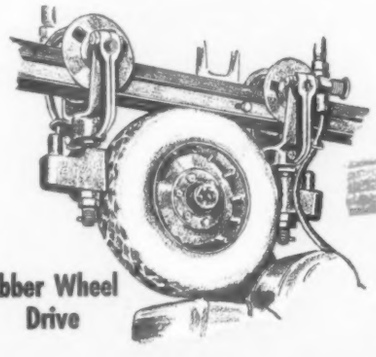
Narrow Flanges



Twin Section Track



Rubber Wheel Drive



BETTER

PRODUCTION NOW!

IMPROVED POSITION THEN!

NOW, when the need is great, you can better your production of war material with American MonoRail equipment in many processes where handling impedes your war effort.

Later, after Victory, you will have essential equipment available for changes in product or process. American MonoRail, because of its extreme flexibility, offers such versatile application without costly adjustment or lengthy engineering. American MonoRail standard parts fit quickly into complete systems to solve a wide variety of handling problems. Prepare now for changes then—equip now for speed up toward Victory!! Let our engineers show you results obtained in hundreds of successful installations.

WRITE FOR Blue Book illustrating hundreds of MonoRail installations.

THE AMERICAN MONORAIL CO.

13104 Athens Avenue ★ Cleveland, Ohio

(*Continued from page* 106)

little oil on the troubled waters, or perhaps more properly speaking, a dash or two of water on this burning citizen. I admitted that it is only natural for a person familiar with a certain subject to become mildly annoyed when he hears or reads a statement laid down with pontifical gravity by a person who pitifully reveals his ignorance of that particular subject. However, I saw no need of working himself into a state that inevitably brings on stomach ulcers. Still less could I see that he had sufficient provocation to emulate the darky at the camp meeting, who in a phrensy of religious excitement begged that somebody would nail his yeahs to da gospel pole, pour on a gallon of kerosene an' set fiah to him.

"Well," said Bill, "I'll tell you. It is tough enough to have to read some of that kind of tripe. The real payoff comes when you hear another lad quoting this stuff with greater faith and confidence than if he was repeating one of the holy gospels. The other day I heard a bird commenting on this idle blast furnace item. He added some observations of his own which showed that he knew as much about blast furnaces as my young toddling grandson—as fine a lad as ever I laid an eye on—knows about shooting snipes with a bow and arrow.

"A crying shame, this highly patriotic citizen declared, that for want of wholehearted co-operation on the part of the people, these flaming blast furnaces that should be turning out ships, tanks, guns, and—er—all that kind of stuff 24 hours a day, are standing dark and cold every other day. This is not so bad in the summer time, but now in the winter time it is something serious with the danger of having all the pipes and things frozen. Then again there is the economic factor to be considered. A whale of a lot of extra work is involved in drawing the fire from under the furnace each time it is closed down, and then lighting the fire and getting the furnace going again when enough stuff has been accumulated to make another batch of steel.

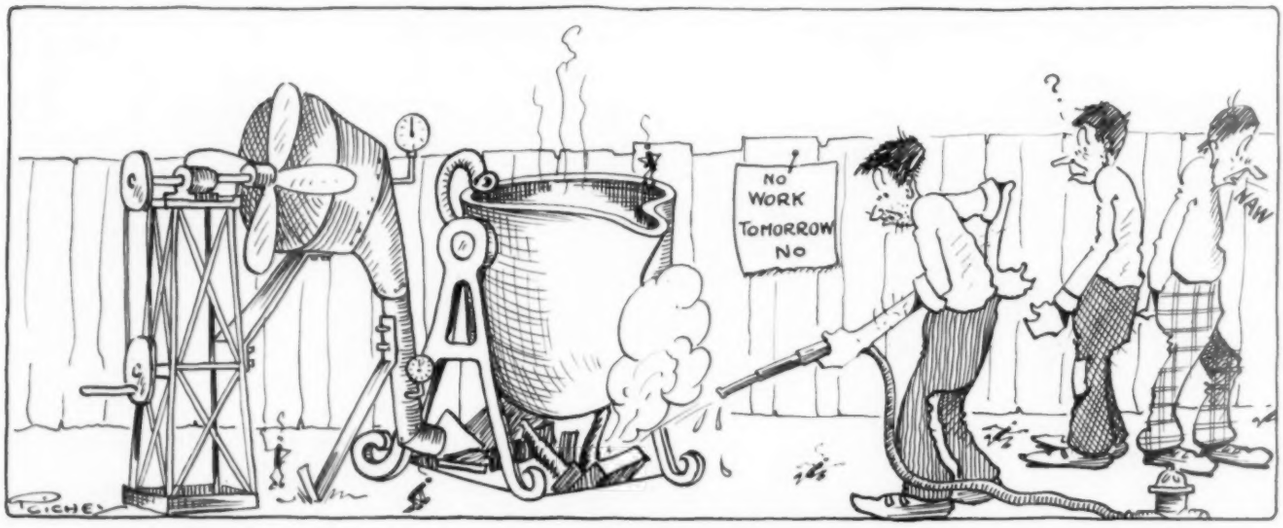
"A second equally well informed citizen said that was all very true, but the angle that caused him to wonder what the world was coming to, was the attitude of these here now brawny birds who puddled the steel at the blast furnaces. Many years ago they worked 12 hours a day. After the last war the time was cut down to 8 hours. During the depression period sentiment was highly in favor of a 6 hour day, or 36 hours a week. Now on account of want of scrap these lads are working only about 20 hours a week and according to that item you seen in the paper, Joe, they are howling about it. No use. You can't please some people.

"You know," said Bill, "it is a relief to get away from all that kind of thing and get back in the foundry where men either know what o'clock it is, or show an inclination to find out. I had an inquiry recently from a foundryman who was considering the substitution of a gray iron casting 6⅝-inch outside diameter, 14 inches in length, for a part formerly made by swedging a piece of standard steel pipe. This casting has to withstand a hydraulic pressure of 2000 pounds per square inch after machining and up to 1000 pounds per square inch pressure in service. A 1½-inch cored hole at each pointed end is to be tapped and bushed for pipe connection. Potential order for these castings may extend into thousands. They are designed to hold gasoline, lubricating oils, glycerine, etc., at temperatures not to exceed 150 degrees Fahr. He would appreciate suggestions on metal thickness and composition, methods of foundry practice and any other pertinent information.

"A suitable 1000-pound charge for these castings ½-inch thick might contain 250 pounds malleable bessemer pig iron, 500 pounds shop scrap, 250 pounds steel scrap and 5 pounds nickel to show the following analysis: Total carbon 3.25 per cent, silicon 1.25 per cent, nickel 0.50 per cent, sulphur 0.04 per cent, phosphorus 0.10 per cent, manganese 0.50 per cent. A more elaborate alloy iron contains: Total carbon 2.60 to 2.80 per cent, graphitic carbon 1.80 to 2.00 per cent, combined carbon 0.80 to 0.90 per cent, silicon 1.60 to 1.80 per cent, sulphur 0.04 to 0.08 per cent, phosphorus 0.10 to 0.20 per cent, manganese 0.40 to 0.60 per cent, nickel 0.40 to 0.50 per cent, molybdenum 0.80 to 1.00 per cent, chromium 0.50 to 0.60 per cent, titanium 0.10 to 0.20 per cent. This metal will show a brinell hardness of 260 and a tensile strength of 64,000 to 66,000 pounds per square inch. Composition of the metal is an important factor, but is not the most important factor in the production of these castings.

"If the mold and core are not handled properly, the casting will leak under pressure, irrespective of the metal composition. The metal must fill the mold quietly. Where the metal boils violently the effect is quite apparent and suitable steps can be taken to prevent a reoccurrence. The insidious form of defect, porous metal in which the voids are too small to be seen, is caused by a slight boiling action which sets up a tremor in the metal and ceases before the mold is filled. This slight tremor is sufficient to separate the iron grains far enough to permit water to seep through under high pressure. To prevent this condition the molding sand should be highly permeable and the core should be vented liberally, properly baked, and should

(*Concluded on page* 140)



In this carefully guarded new and secret process for melting miscellaneous scrap the bottom is not dropped

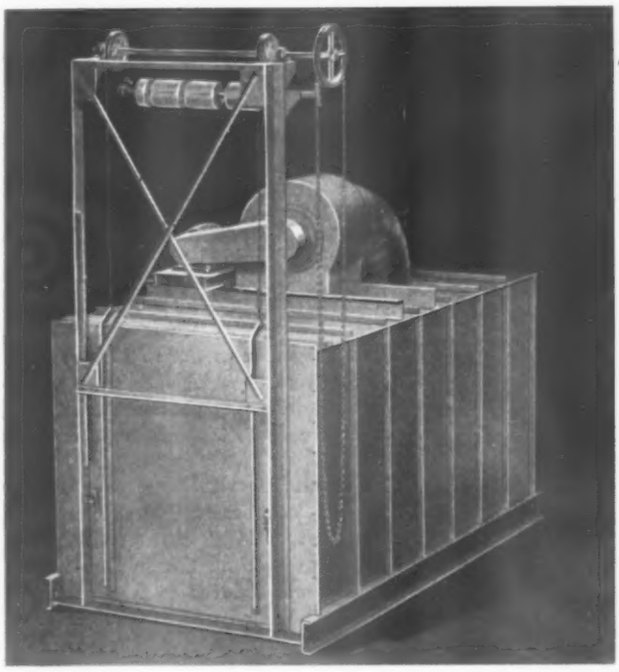
WAR

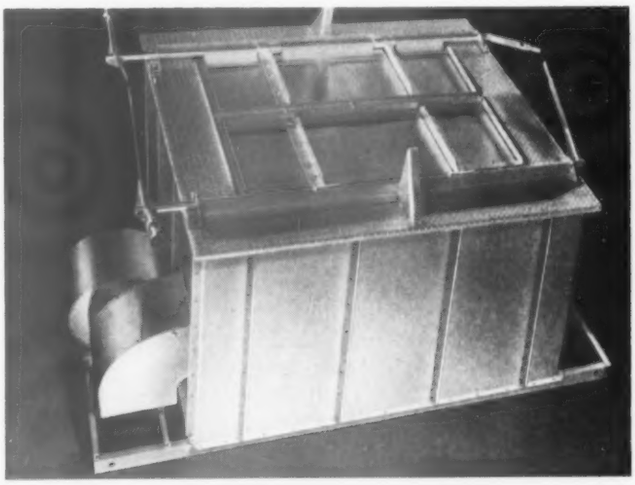
presents new foundry problems

WAR has brought many new and unfamiliar products into the foundry. Gray iron foundries find they have to heat treat rolled magnesium. Steel foundries are faced with the problem of aging cast and extruded aluminum parts. Nonferrous foundries have other groups of problems new to them.

For over twenty-five years Young Brothers Company has built core and mold ovens for the foundry industry. These same ovens may also be used in the production of some of the new products foundries are now making—but not all. For others, new and radically different types of ovens are needed.

These special ovens, however, are not unfamiliar to Young Brothers engineers for they have been building them for a wide range of industries. These engineers, with their broad experience, can now render valuable assistance to the foundryman with his new problems. If you have one, get in touch with the nearest Young Brothers representative.





Industrial Ovens for All Purposes

YOUNG BROTHERS COMPANY

6508 Mack Avenue, Detroit, Michigan • *Branch Offices in Principal Industrial Cities*

In California at: 277 SEVENTH STREET, SAN FRANCISCO and 406 SOUTH MAIN STREET, LOS ANGELES

Foundry Developments at short range

DETERMINATION of source of gas unsoundness in copper-base alloys is not an easy matter since investigations show that any one or all of a number of factors may be responsible. They include evolution of hydrogen, water vapor, carbon monoxide, or sulphur dioxide during solidification of the alloys. Also hydrogen and oxygen can co-exist in molten bronze and recombine during solidification with the resultant evolution of steam.

♦ ♦ ♦

As a deoxidant for tin bronzes, phosphorus usually is introduced through the medium of 15 per cent phosphor-copper. It is customary to add 2 ounces of that alloy to 100 pounds of bronze, and that amount is equivalent to approximately 0.02 per cent phosphorus. It is a good precaution to skim before adding the phosphor-copper. Addition to the pouring ladle at the time the temperature is taken permits an interval for reaction before the metal is poured into the mold.

♦ ♦ ♦

With the constantly expanding application of duplexing and triplexing processes to increase steel casting production for the war effort, there seems to be two schools of thought on the best procedure to make steel which will meet rigid requirements on physical properties. One believes that a continuous cycle in which only part of the refined steel is withdrawn from the electric furnace at regular intervals and poured into castings while fresh additions of steel from the other units are added to the furnace, will serve satisfactorily. The other school believes that the refined steel in the electric furnace must be removed completely each time, a fresh charge of molten metal is added and refined. In those cases where trouble has been encountered, using the first mentioned procedure, can it be that in the effort to speed production some step in the refining process was not given sufficient time to permit completion of the necessary reactions?

♦ ♦ ♦

With mica listed as one of the nation's critical materials the Western Cartridge Co., Alton, Ill., successfully has used glass fiber tape in place of that material for coil insulation in the primary coil of induction type brass furnaces. Use of the glass fiber tape insulation made it possible to increase furnace temperatures up to a point where it was possible to produce 5 heats of 1500 pounds each during an 8-hour shift as compared to previous results of 3 heats per shift from each furnace. Cost of the glass fiber insulation and of installation is said to be less than for mica.

♦ ♦ ♦

An electrical device developed for determining the wall thickness of ferrous castings and wrought products from one side only has been applied to the detection of cracks in castings. The method involves the comparing the resistance of the metal wall under test with that of a similarly shaped wall of the same material which is known to be free from flaws.

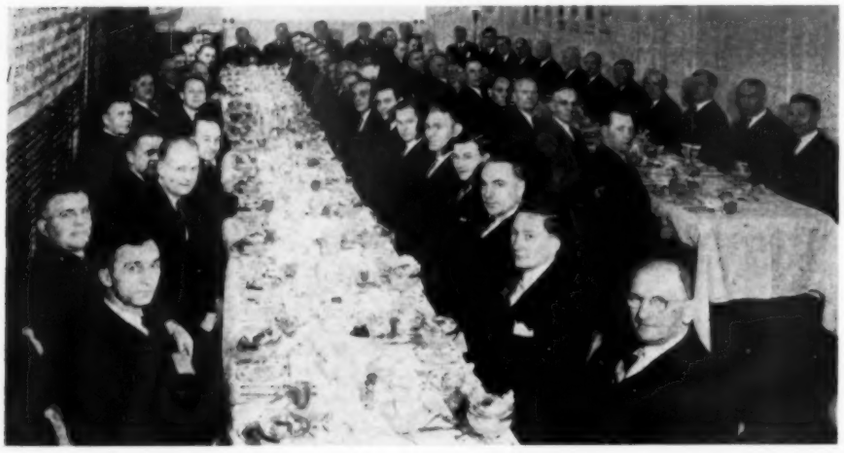
♦ ♦ ♦

Thorium additions to gray cast irons act like cerium additions in that they reduce sulphur content according to a recent investigation. Amounts of thorium added ranged from 0.2 to 1.0 per cent and the irons to which they were added contained about 2.96 per cent silicon, 3.16 per cent carbon, 0.43 per cent manganese, 0.95 per cent phosphorus, 0.15 per cent sulphur, and 2.77 per cent silicon, 3.19 per cent carbon, 0.43 per cent phosphorus, 0.12 per cent sulphur. With 1 per cent thorium the sulphur in the first iron was reduced to 0.10 per cent, and in the second iron to 0.08 per cent. Transverse strength was increased 8.9 and 6.6 per cent respectively, and tensile strength was increased 11.2 and 8.3 per cent respectively. Improvement in properties is believed due to graphite refinement and better degasification of the metal.

♦ ♦ ♦

Particles as small as one millionth of an inch—one thousandth of the diameter of a human hair—can be measured accurately with the new electron microscope developed by General Electric engineers. Optical system in the microscope maintains a fixed magnification regardless of voltage variations. In the new instrument a specimen can be enlarged 10,000 times, and further enlargement of the picture is made photographically up to 100,000 times the size of the original specimen or better.

Supervisors Celebrate Record Production



Supervisors of the Whiting Corp., Harvey, Ill., recently were entertained at dinner at the Del Prado Hotel, Chicago, in recognition of breaking all production records during the month of October. A handsome engraved clock was presented by H. D. Grant, president, to Dr. W. A. Pearl, plant manager, in honor of the occasion. Pins were awarded to all supervisors. Sixty persons attended the dinner

Sly Dust Filter exhausting blast room in large foundry.

SLY DUST CONTROL

Helps Maintain Quality and Quantity

THROUGHOUT industry Sly Dust Control is aiding both quality and quantity of production. It means cleaner plants, with better working conditions* for employees—a safeguard for health—an incentive for *good* and *continuous* work.

This system offers certain *exclusive* features because of the advantages of Sly Dust Filters (the heart of the system):

1. Greater filtering capacity because of more filtering cloth.
2. Taut bags (patented) save power and improve dust removal.
3. Bags more easily replaced.
4. Automatic control (any degree) minimizes or entirely removes the human factor.
5. Simpler shaker mechanism results in savings in maintenance and operation.

With all of its advantages, Sly Dust Control is *not* expensive. Ask for Bulletin 98 and state your problem so that we may write you fully.

*Good working conditions cut down absenteeism

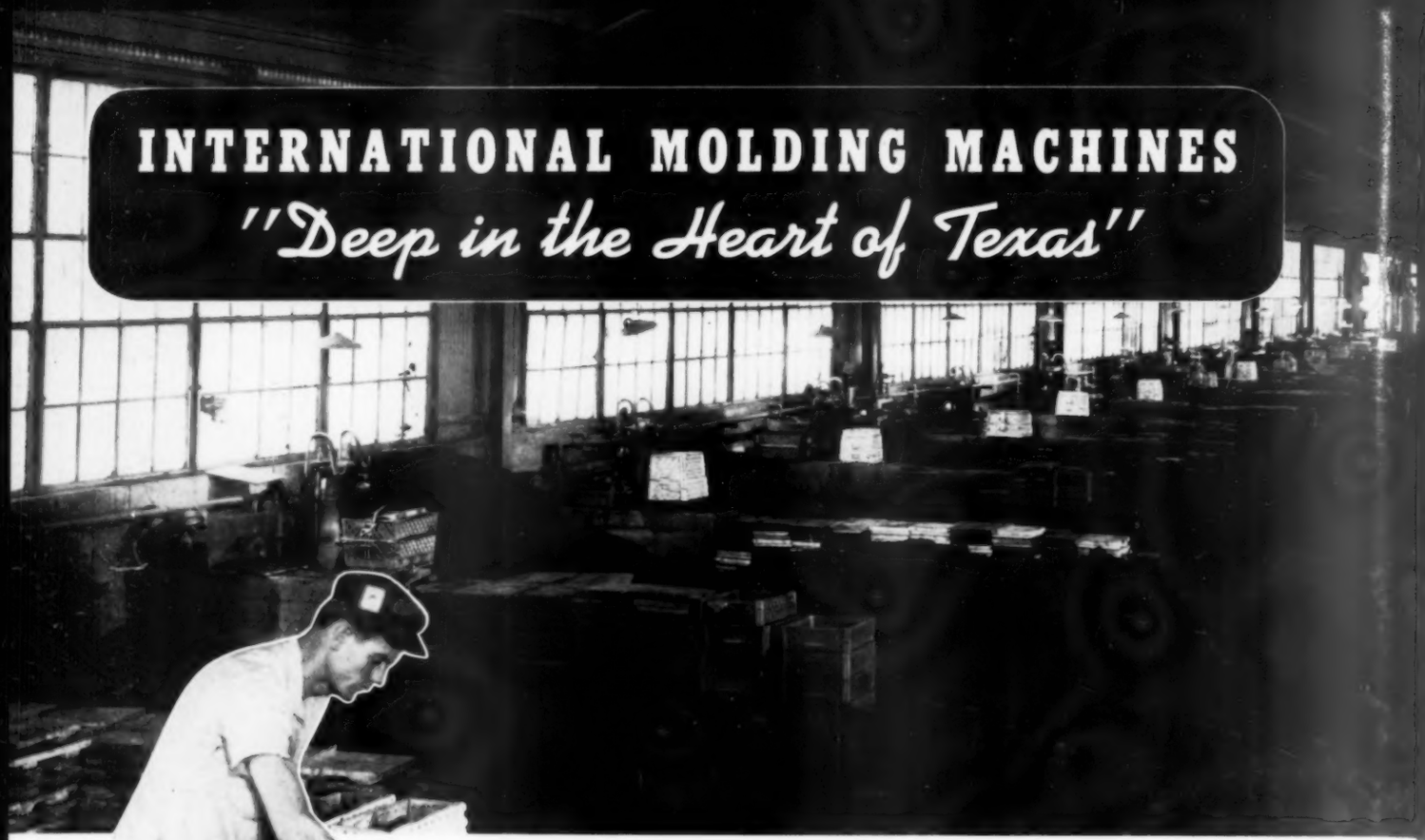
THE W. W. SLY MANUFACTURING CO.

4759 TRAIN AVENUE CLEVELAND, OHIO.

TUMBLING MILLS **SLY** INDUSTRIAL DUST CONTROL BLAST CLEANING EQUIPMENT

INTERNATIONAL MOLDING MACHINES

"Deep in the Heart of Texas"



Type PJS
Jolt Squeezers

Type G
Jolt Ram,
Power Turnover,
Foot Draw Machine

Type JDP
Jolt Ram, Power
Pin Lift Machine

Speed up your shop - Increase the flow of Castings needed to build War Weapons by using

INTERNATIONALS

Meet your obligations to advance the date of VICTORY

A copy of our new KEY Catalog sent upon your request

INTERNATIONAL MOLDING MACHINE CO.

2608-2624 W. 16th St., Chicago, Illinois

READER'S COMMENT

Readers are invited to comment upon articles and other editorial material appearing in THE FOUNDRY. *The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for withholding his identity. Letters should be brief.*

THE EDITORS

Gray Iron Production Steady

TO THE EDITORS:

We noted with some surprise your editorial in the January edition of THE FOUNDRY in which you speak of the disastrous effects of Limitation Orders on what you term "The Gray Iron Branch".

It is true that serious dislocations have been occasioned by these orders in the gray iron foundry industry. The ingenuity of the executives of these plants has been by no means exhausted and we believe that were the truth known, it would be found that the gray iron foundry industry as well as its highly competitive brother, the malleable foundry industry, which you mention as having succeeded in making numerous substitutions, has not lagged far behind if at all. The tonnage is holding steady at about six times that of steel castings and while this is spread pretty thin in spots where sales initiative and proper equipment to handle types of work hitherto not attempted are lacking it is believed that the story is not so severe as your editorial would imply.

The gray iron foundry industry differs from the other foundry industries, which are highly competitive with it, in that it consists of 2856 plants scattered from Maine to Honolulu, whereas the malleable and steel foundries are comparatively few in numbers, larger in size and readily organized into a compact group in each case. We believe that the scope of the gray iron foundry industry is little realized nor given consideration by the engineering and manufacturing fraternities, nor even by the foundry executives themselves. The producer of castings for the huge machinery used in steel mills, rubber plants, sugar factories, et cetra, gives little thought to the minute parts in an automatic telephone switchboard, or slightly larger castings used in airplanes, textile machinery, business machines, electrical appliances, etc. The diversity of products distributed over so large a number of plants, practically all of which are small, leads both producer and consumer to the false premise that this industry, which does a business of a billion and half dollars a year and employs over 250,000 men, is a small one. This has operated greatly to the disadvantage of the gray iron foundries not receiving the consideration which is their due in the war emergency and has placed the onus of securing work entirely on the laps of the foundrymen themselves.

It has been our experience that it is far more difficult to find an industry where gray iron does not play an important part than it was where it does and while individual cases of distress are unquestionably appearing, we believe that it is due far more to ignorance on the part of those carrying out the war program of what gray iron can do than to its inability to perform.

The statement of large idle capacity is quite likely to be misleading to those operating the war program and encourage a half-baked scheme of concentration which really might lead to disaster both in the foundries and to our customers.

W. W. ROSE,
Executive Vice President
Gray Iron Founders' Society, Inc.
Washington

Operates Small Cupola

TO THE EDITORS:

The January issue of THE FOUNDRY on page 82 in the Questions and Answers department, includes an article, "Will Melt Gray Cast Iron in Small Diameter Cupola". That article was of interest to us because we are operating a cupola of the same size, with one exception, it has only two tuyeres, set directly opposite of each other. We have operated this cupola for 3 years with success, and we would like to relate some of our experiences. The tuyeres are 4 inches in height, 12 inches long on the inside, and tapered to 8 inches on the outside next to the shell.

The sand bed is made 4 inches thick and the tuyeres are 12 inches above the sand bottom. The slag hole is about 2 inches below the tuyeres. We use 163 pounds of 2-inch coke which extends approximately 36 inches above the tuyeres for the bed charge and let the bed charge burn through well before the first charge of iron is added.

The charges are made up of 400 pounds of iron, 40 pounds of coke, and 10 pounds of limestone. Of course, the pig and scrap are mixed accordingly in proportion to the kind of iron desired. The blast pressure is 7½ ounces. We do not know what the air volume is because there is no volume meter on the cupola.

We have a 400-pound bull ladle and by watching the slag hole carefully, and just as the iron shows at the slag hole, we tap out and can draw the ladle full to every tap, sometimes a couple of hand ladles extra.

On several occasions we have melted six 400-pound charges, which is 2400 pounds, in a little less than one hour.

GEORGE ZIRKLE
Foundry Vocational Instructor
Senior High School
Springfield, O.

1942 Index Ready

Index of Volume 70 of The Foundry, covering all editorial material published during 1942, now is available. The Readers' Service Department of The Foundry, Penton Building, Cleveland, will send the index free to subscribers upon request.

Cannot Use Aluminum

TO THE EDITORS:

Your attention is called to the Question and Answer Section of your January, 1943, issue, page 84, on the use of aluminum scrap as a deoxidizer.

It is felt that you should immediately advise your purchaser and publish a correction on the failure to call your client's attention to the fact that aluminum scrap for deoxidizing cannot be used legally by any person.

The aluminum scrap Order M-1-d states specifically in paragraph (c), "No Person other than a producer or approved smelter may melt, reprocess, smelt or otherwise use Aluminum Scrap unless specifically authorized by the director of priorities."

It is necessary for any person who wishes to use aluminum for the deoxidation of steel, to present their application on a PD-1A application form, covering their requirements per calendar quarter. When this application has been approved, the user may then purchase the necessary deoxidizing metal in either shot or notch bar form from any approved smelter, and this constitutes the only way he may acquire aluminum for this purpose.

It is also felt that such restricting orders should have been called to your questioner's attention in the last paragraph of your reply. Will you kindly make the necessary correction and advise?

CARL H. BURTON, *Chief*
Reclamation & Inventory Branch
Aluminum & Magnesium Division
War Production Board
Washington

activities of foundry groups

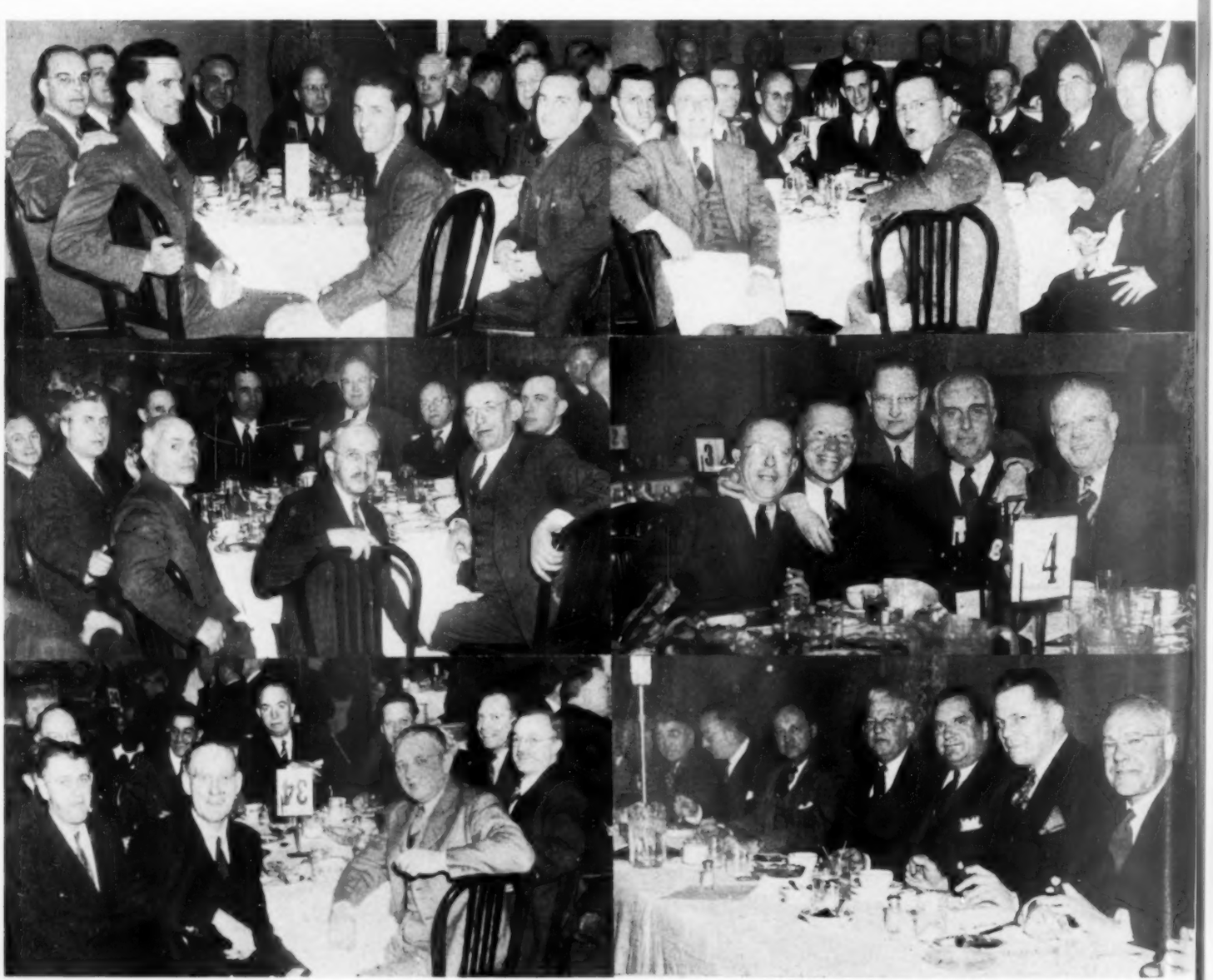
Philadelphia

DESPITE the foggy weather, 75 members and guests attended the Dec. 11 meeting of the Philadelphia Chapter of the A.F.A. held at the Engineers Club, Philadelphia. Taraknath Das, a native of India and a graduate of Georgetown University, spoke on the underlying reasons for the present war and his explanations gave all something to think seriously about.

E. J. Brady, Alloy Rods Co., York, Pa., and previously chief engineer, Western Foundry Co., Chicago, was technical speaker of the evening, and presented a paper on, "Co-operation of the Engineer, Patternmaker and Foundryman". Illustrating his subject with numerous slides, Mr. Brady pointed out the importance of having the engineer, patternmaker and foundrymen work together in the designing of all castings in order to reduce losses and to increase production in the foundry. Mr. Brady pointed out how such simple matters as properly constructed patterns having the required amount of draft and shrinkage allowances will enable the foundry to produce better castings to closer dimensions as required by the casting user. One degree of draft, which is equal to 1/64-inch is a fairly workable rule but is not ironclad and must be used with judgment. Use of the largest permissible fillets at the junction of vertical and horizontal surface will often do more good in obtaining a clean draw than additional draft. Machine drawn patterns generally require less draft than hand patterns. Rules applying to pattern draft

(*Continued on page* 116)

Members and guests numbering 450 *were on hand to enjoy the annual Christmas party of the Philadelphia Chapter of the A.F.A. which was held at Hotel Philadelphian, Philadelphia, Dec.* 21



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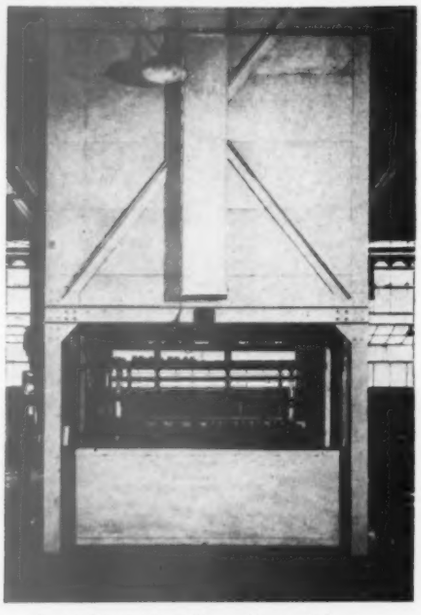
..are chosen by concerns of national prominence!

●Carl-Mayer Core and Mold Ovens have attained their high position in the foundry industry because of their ultra-modern design, exclusive recirculating air heater system and high grade rugged construction.

Wire or write for illustrated Bulletin 141, or a Carl-Mayer Oven Engineer.

Three new Continuous Monorail Core Ovens similar to this, for Ford Airplane Engine Plant.



Typical large Carl-Mayer Vertical Oven as installed for General Motors, Electric Autolite, Cadillac and other outstanding foundries.

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All Types **CARL-MAYER CORE AND MOLD OVENS** *All Sizes*

SERVING CONCERNS LIKE *these*:

Aluminum Co. of America
American Magnesium Corp.
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Dunkirk Radiator Co.
Eclipse Aviation Division of Bendix Aviation Corp.
Electric Autolite Co.
Ford Motor Co.
Fox Furnace Co.
Fort Pitt Steel Casting Co.
Frank Foundries Corp.
Fremont Foundry Co.
G & C Foundry Co.
General Motors Corp.
General Electric Co.
Gilbert & Barker Co.
International Heater Co.
Packard Motor Co.
Shenango Penn Mold Co.
Studebaker Corp.
Whiten Machine Works
Whiting Corp.

Shown at the annual stag party of the Southern California Chapter of the A. F. A. are: Seated, left to right, Earl Anderson, chairman and E. M. Hagener, secretary; standing, left to right, Richard Hughes, chairman, entertainment committee and George Emmet, a past chairman of the chapter; on the stage, left to right, Leonard Hofstetter, custodian and Walter Haggman, vice chairman.

(*Continued from page* 114)

also should apply to core boxes. The matter of correct shrinkage allowances should be discussed thoroughly by patternmakers and foundrymen, as shrinkage requirements will vary according to the design of the pattern. A shrinkage allowance not to exceed 1/10-inch is a safe procedure on all round patterns for gray iron and for other metals proportionately less.

Core prints should be made accurately and good judgment and suggestions from the foundryman should be used to determine the proper size and length to be used. Crush strips are important parts of nearly every core print. Size of the strips again is a matter of good judgment and they may vary in section from 1/64 by ⅛-inch on ½-inch prints or under, to ⅛ by ⅝-inch on core prints 20 inches in diameter. Their use permits a tighter fitting core which results in more accurate castings.

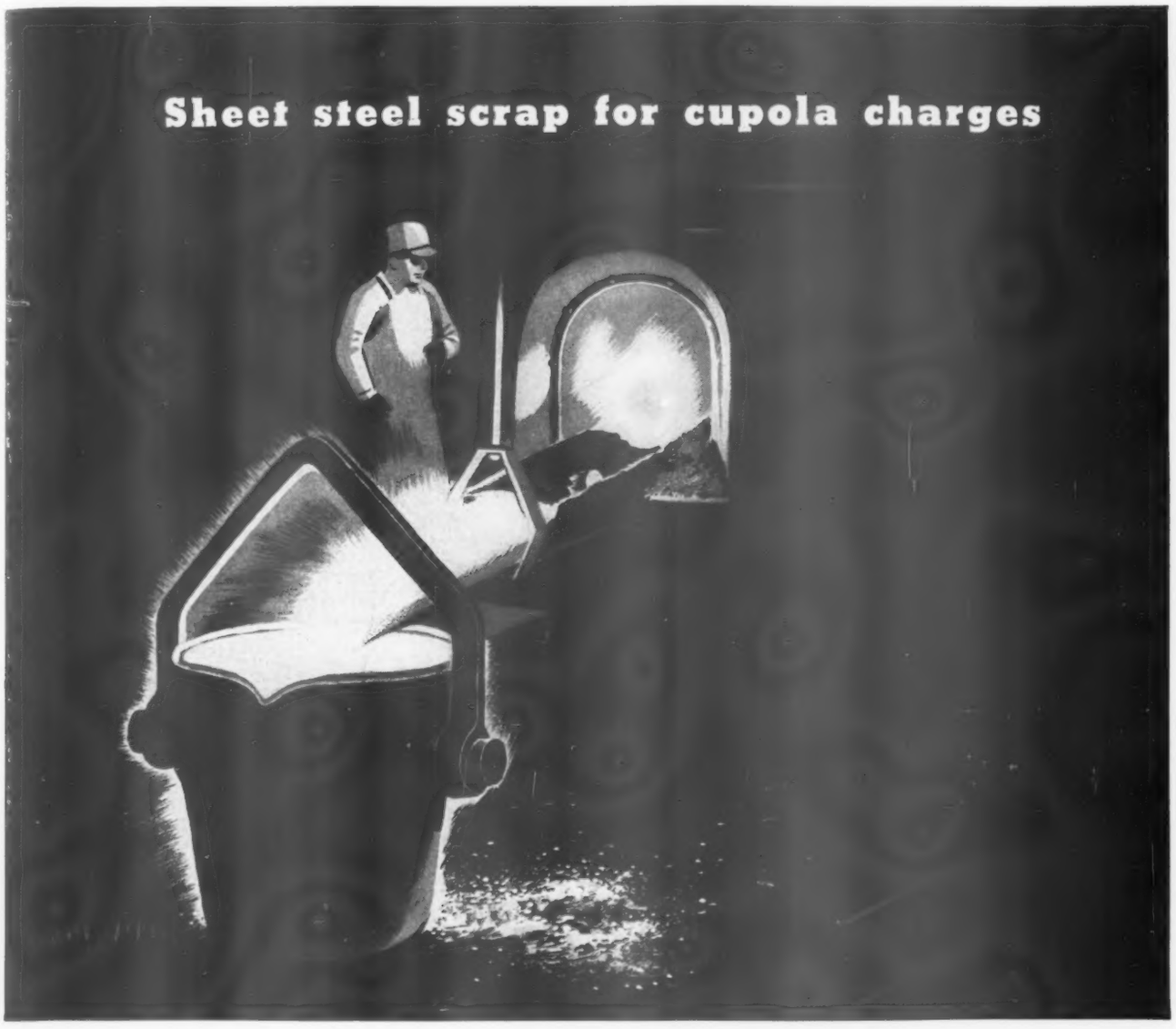
Timers or tell tales of the right kind are important on patterns where needed and when possible should be placed on the largest core dimensions, thus obtaining the best leverage for holding the core in position. Ram up cores have an important place on certain patterns where there are deep pockets, where nails, soldiers or gaggers ordinarily would be used, on straight up and down walls where it is difficult to get a good draw, as a support for core prints where the weight of the core is out of proportion to the size of the openings and also as a more rigid anchorage for long vertical cores.

Good patterns should have markings to show location of chaplets, and the thickness of chaplets to be used. Bosses should be incorporated on either the inside or outside of the casting wall so

(*Continued on page* 118)

Attendance was limited to 1000 *members and guests at the annual Christmas party of the Northeastern Ohio Chapter of the A.F.A. held at Hotel Carter, Cleveland, Dec.* 10. *Photographs courtesy Sterling Farmer, Sand Products Corp., Cleveland*

Sheet steel scrap for cupola charges



Information supplied by an Industrial Publication

When certain precautions are observed, light steel sheet scrap (30 gauge and up) can be successfully used in cupola charges for making gray iron.

Black sheet is the best variety to use. The use of tinned, galvanized or stainless steel scrap sheet should be avoided.

When possible the scrap should be briquetted, or baled, before charging. Bundles should be smaller than those used in the open hearth, to prevent hanging in the cupola. The density of the bundles is important. Density can be controlled by varying the pressure exerted by the hydraulic press. In some cases a minimum density of 30% is specified.

When briquetting is not practicable for any reason it is possible to melt some light sheet in the charge by using a soft blast.

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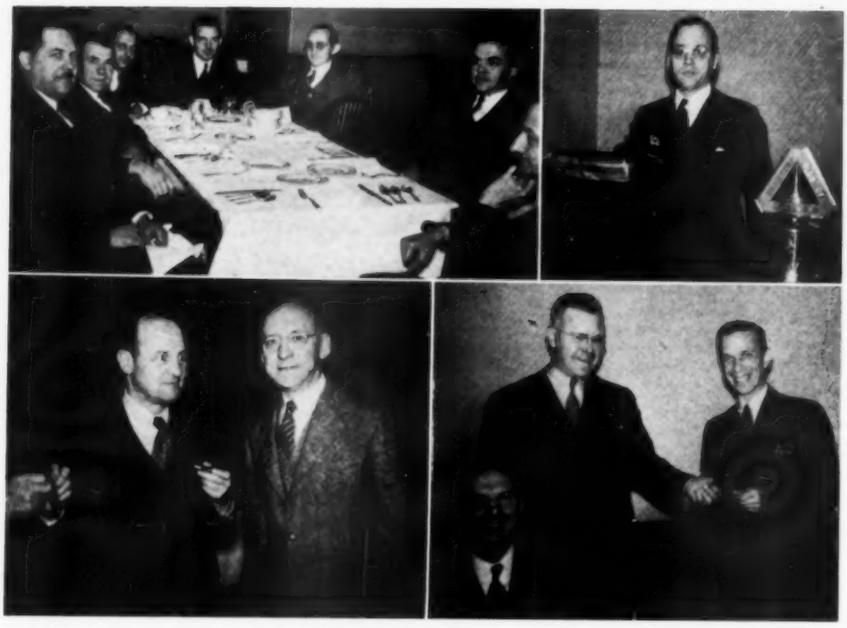


Members and guests of the Chesapeake Chapter of the A.F.A. who were on hand to hear Harry W. Dietert, Harry W. Dietert Co., Detroit, shown at the upper right and, who discussed properties of sand for cores, included: At upper left table, Edward Hartman, R. E. Mortin, Pangborn Corp., Hagerstown, Md.; Howard F. Taylor, Robert F. Morey, Naval Research Laboratory, Anacostia, Washington; C. M. Saeger Jr., U. S. Bureau of Standards, Washington; Ira Pike and Frank Kaiss, Pangborn Corp. Lower left, left to right, J. L. McCleary, Frick Co., Waynesboro, Pa. and Bert Reed, Whitehead Bros. Co., Philadelphia. The illustration at the lower right shows E. W. Horlebein, Gibson & Kirk Co., Baltimore, presenting the free meal ticket to the holder of the lucky number. Photographs courtesy of Frederick K. Bruggman, Industrial Supply Corp., Baltimore

(*Continued from page* 116)

there will be a sufficient amount of metal surrounding the chaplet to make a good weld. Mr. Brady paid tribute to those engineers and patternmakers who realize the advantages of co-operating with foundrymen and make a practice of working with them.

The 1942 Christmas party of the Philadelphia Chapter of the A.F.A. was held Dec. 21 at Hotel Philadelphian, Philadelphia, with 450 members and guests present. After a fine turkey dinner, the members gathered around to enjoy one of the best floor shows seen by any group. Much credit is due Jack Robb, Hickman, Williams & Co., and to his committee for their efforts in making the party such a success. Door prizes consisting of 10 turkeys were distributed among those present as the grand finale. —*William S. Thomas, chairman, publicity committee.*

Pittsburgh

REPLACING the customary Christmas party, the Pittsburgh Foundrymen's Association, in tune with the times, held a regular meeting Dec. 14 at Hotel Roosevelt. Replacing the customary technical speaker, however, was Reverend Bernard C. Clausen, pastor of the First Baptist Church, Pittsburgh, who delivered a Christmas message.

The entertainment committee, under the chairmanship of John P. Bankson, Harbison-Walker Refractories Co., arranged a schedule of entertainment including group singing, a magician, and presentation of the Army sound picture, "The Tanks Are Coming."

—*R. L. Hartford*

Metropolitan

MECHANICAL phase of foundry practice was put aside and the ever-increasing problem of manpower was discussed at the Jan. 4 meeting of the Metropolitan Chapter of the A.F.A. at the Essex House, Newark, N. J. The speaker was Lieut. J. Douglas Gassford, U. S. N. R., public relations office, Third Naval District, New York.

Lieut. Gessford cited that absenteeism is a serious problem in industry today and has resulted in a loss of many man hours of work. The Navy Department has made a survey of conditions and is ready to offer suggestions as to methods of decreasing the number of unexcepted absentees. Lieut. Gessford mentioned also that any suggestions that industry might have on this subject would be welcome. Accompanying Lieut. Gessford were two men who had returned recently from our battle fronts. Pfc. Nick Sileo had been in the Solomons and related his experience with the Japanese. Gunner's Mate, second class, George Lambert had been aboard transports in the Mediterranean sea and had just received a citation for gallantry in action.

Their descriptions of experiences brought home strongly an idea of what

(*Continued on page* 122)

Accompanying illustrations show some members and guests present at the Nov. 12 meeting of the Northeastern Ohio Chapter of the A.F.A. which was held at the Cleveland Club, Cleveland. The meeting followed a visit to Case School of Applied Science during the afternoon. Photographs courtesy Sterling Farmer, Sand Products Corp., Cleveland

A STAR PERFORMER *On the* WARTIME INDUSTRIAL FRONT

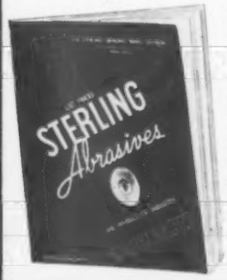
Take a good look at one of the most important men in wartime industry today. In steel mills and foundries, you'll find him working extra hours and liking it . . . turning out extra work faster and liking that, too!

Being in such important work, he naturally looks for the finest equipment to help him with his task of beating the Axis. His grinding wheels, for example, must be made to solve his particular problem. Just any grain or bond won't do . . . specialized wheels for specialized jobs are the rule today!

Naturally, this workman has welcomed the assistance provided by Sterling engineers. Through consultation with our representatives, it is possible to select grinding wheels that last longer, run cooler, and do a quicker job.

Do you have a grinding problem that needs a speedy solution? Write us today and, together, let's solve it!

Send for This Book Today!



Every foundry foreman should have a copy of the Sterling No. 42, 80-page Catalog. It contains interesting and important information to assist you in ordering the proper wheels for your jobs. We will gladly send it upon request.

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THE STERLING GRINDING WHEEL DIVISION
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THE WHEELS OF INDUSTRY

Largest attendance of any of the Wisconsin Chapter's Christmas parties was on hand Dec. 18 at Hotel Schroeder, Milwaukee, to enjoy the dinner and floor show. The above illustration is a general view of the members and guests present, and the photographs reproduced at the bottom of the page are through the courtesy of John Bing, A. P. Green Fire Brick Co., Milwaukee

BORON

goes into the lineup!

To make available materials go as far as possible is now an urgent responsibility of the metallurgist. He must still meet very exacting specifications in the physical properties obtained. But a new resource has come to his aid. Improved methods of introducing Boron as an alloying element in irons and steels have been developed, with satisfactory results. Full information is offered by the Molybdenum Corporation, producer of Molybdenum, Tungsten, and Boron.

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MOLYBDENUM CORPORATION OF AMERICA
Grant Building Pittsburgh, Pa.

MCA

(*Continued from page* 118)

our armed forces are doing in the various theaters of war. Their efforts on our behalf make insignificant our best efforts. Presentations such as given to the chapter group also are made to industry, and when presented to men who make it a practice of taking time off, should have a marked beneficial influence.

Next meeting of the chapter will be held Feb. 1 at which time F. Foxall, foundry department, Eclipse-Pioneer Division, Bendix Aviation Corp., will speak on "Aluminum and Magnesium Foundries.—*R. E. Ward, publicity committee.*

Northern California

ANNUAL Christmas party of the Northern California Chapter of the A.F.A. was held Dec. 22 at the St. Francis Hotel, San Francisco, with 180 men and women on hand to enjoy the festivities. The chapter's past chairman, E. M. Welch, was presented a coat lapel A.F.A. pin, and Charles J. P. Hoehn, Enterprise Foundry Corp., senior past officer, was presented a ring with the A.F.A. insignia. Guest speakers included Herman Weinberger, a prominent San Francisco attorney, who spoke on, "Civil Liberties in War Time", and Lieut. Com. E. J. Demson, U. S. Navy Reserve, whose subject was, "Whose War?"

The next hour the group was entertained with music and dancing performances and by a magician after which there was dancing for everyone.

First opportunity of the chapter to be host to men from the Henry J. Kaiser Magnesium plant at Los Gatos, Calif. was presented Dec. 29, when 10 men from that organization were on hand to describe operations there. Peter Allen, public relations; Dr. W. O. Wetmore, metallurgist, and Robert Chickering, foundry superintendent, took the leading parts in the up-to-the-present description of construction and development progress at Los Gatos. Methods which had been developed to produce the metal and operate the foundry safely were discussed. The chapter was treated to the first public showing of several reels of colored and sound motion pictures of the Los Gatos magnesium plant. Magnesium pigs as well as castings offered some surprise compared with those made of iron or even aluminum. Eighty members and guests were present at the meeting.—*George L. Kennard, secretary-treasurer.*

WARNING to all plants: Beware of the Dust Saboteur—a dangerous character at times, and destructive more often than not.

He's a vandal at heart. Delights in undermining health, ruining machinery and slowing up production. Must be humored on occasion because of a Jekyll-Hyde temperament that frequently cloaks valuable qualities.

Should be placed in solitary confinement without fail and at the earliest possible moment.

If you find this criminal roaming your plant report to us. Our men will trap him for you, because they are experienced in dealing with desperadoes of this kind.

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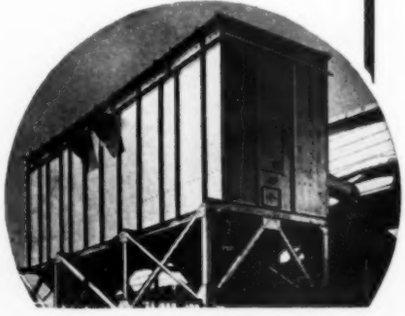

AMERICAN HIGH EFFICIENCY **DUST COLLECTORS**

Toledo

DINNER meeting of the Toledo Chapter of the A.F.A. was held at the Hillcrest Hotel, Jan. 8. There were approximately 40 members and guests present to hear the speaker of the evening, Harry W. Dietert, Harry W. Dietert Co., Detroit, who presented several technicolor films on the effects of high temperatures on cores and molding sands. The films showed the excellent possibilities of the method of testing molding sands by use of the dilatometer. One could see exactly what happens to the various types of molding and core sand boxes when they are subjected to high temperatures similar to those encountered in molds.—*G. W. Buchanan.*

Birmingham

A DESCRIPTION of the operations and plant of the Cincinnati Milling Machine Co., Cincinnati, was featured at the regular meeting of the Birmingham District Chapter of the A.F.A., held at the Tutwiler Hotel, Birmingham, Ala., Nov. 20. Herman K. Ewig, superintendent of foundries, Cincinnati Milling Machine Co., and a director and past chairman of the Cincinnati District Chapter of the A.F.A. was the guest speaker. His topic was, "New Development in Quality, Control and Production of Machine Tool Castings." Mr. Ewig reviewed the company's operation at the plant which was placed in service December, 1940, and which was designed and equipped for the production of machine tool castings by the most modern processes and practices known to the industry. His talk was followed by an exhibition of sales showing the several departments of the plant, and equipment used in the manufacture of castings. He explained the production of castings step

(*Continued on page* 125)

OSBORN MOULDS MUSCLES FOR *America's* WOLF-KILLERS

IN ever-growing numbers the Navy's fast, formidable PC boats—"Sub-Sluggers" to sailors—are putting to sea to track down and destroy the Nazi wolf-packs that prey on merchant shipping. Equipped with sensitive listening devices and locators, they can checkmate the trickiest under-sea tactics. Heavily armed with deck guns, ack-ack and "ash cans" they can blast a hidden sub to oblivion, or punch it full of daylight if they catch it on the surface.

The power and the speed and maneuverability that make such deadly efficiency possible come from twin diesel engines of advanced design now being produced in quantity by America's leading engine builders. The knowledge that Osborn Moulding Machines of the types described on the next page are moulding many of the vital parts for the powerful engines of these wolf-killers is a source of keen satisfaction to all of us at Osborn.

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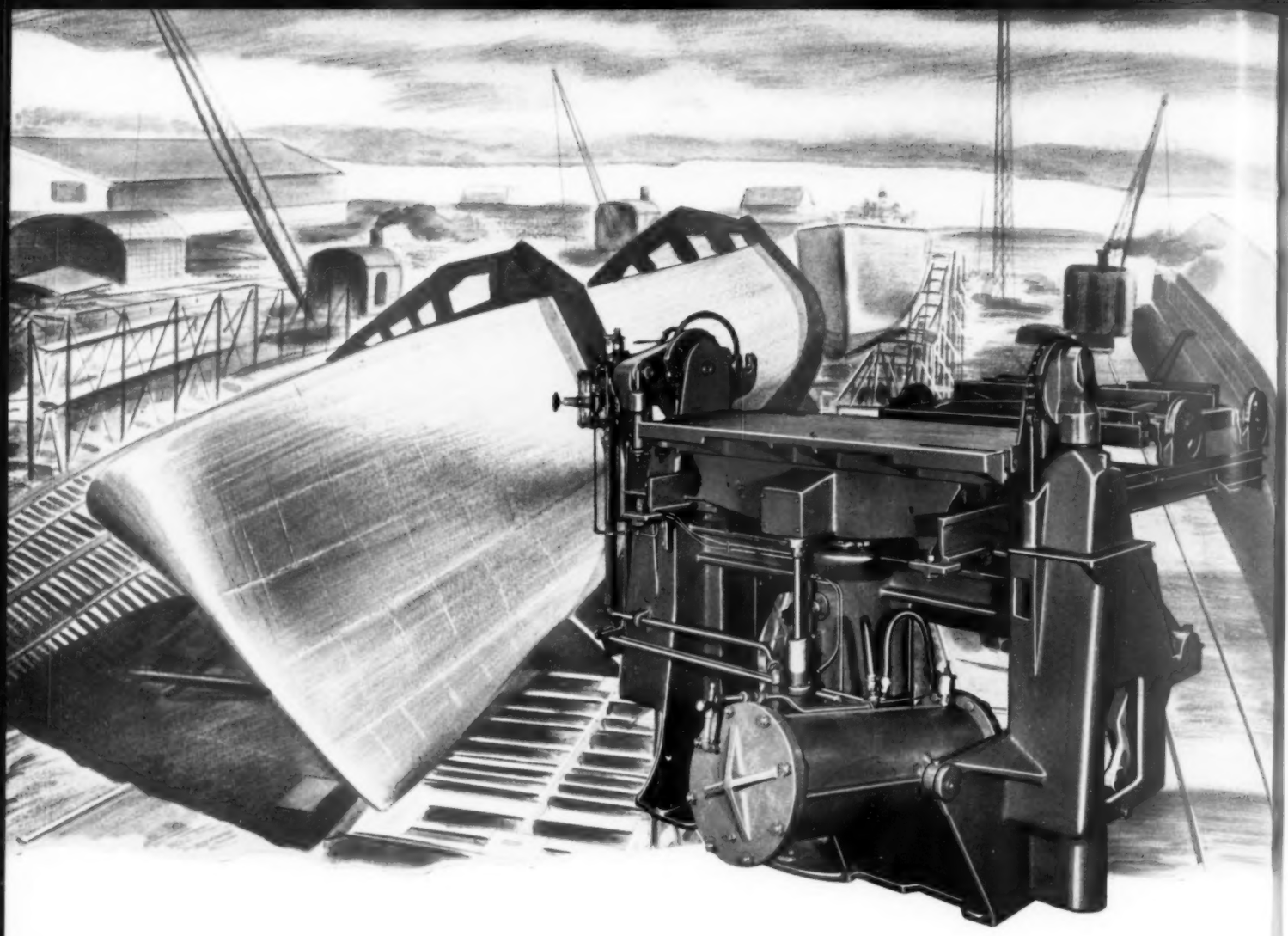
MOULDING MACHINES



PRECISION *and* PRODUCTION

WITH Osborn Moulding Machines, including the 405-type shown above, foundries supplying America's leading diesel engine builders are mass-producing moulds for large numbers of precise, accurate cast parts for the rugged power plants that speed the deadly work of our sub-slugging PC boats.

Here again the combination of quantity production *and* fine, close-tolerance moulding, typical of all Osborn machines, is proving its worth in the war. Heavy of construction, but designed and built for smooth, precise operation, Osborn Moulding Machines have the qualities that will also prove of greatest value in the reconstruction years to come.

THE OSBORN MANUFACTURING COMPANY
5401 Hamilton Avenue *Cleveland, Ohio*

OSBORN

MOULDING MACHINES

(*Continued from page* 122)

by step from the beginning to the finished product. The showing of the views was instructive and enlightening to the foundrymen, and it was pointed out that this was the first public showing of plant pictures. Mr. Ewig expressed appreciation for the valuable assistance rendered by Lester N. Shannon, a director of the A.F.A. in the organization of the Cincinnati Chapter.

John Word, W. J. Vinson Jr., and C. L. Snider, Stockham Pipe Fittings Co.; Archie H. Jones, Goslin-Birmingham Co., Tom Bonds and Dick Waugh, Anniston Pipe Co., were reported as new members of the chapter by R. L. Ogden, co-chairman of the membership committee.

E. A. Thomas, Thomas Foundries Inc., Birmingham, and chapter chairman, presided. The speaker was introduced by R. A. Donaldson, chairman of the program committee. The chapter's February meeting will be held at Hotel Tutwiler on Feb. 15.—*H. B. McLaurine, reporter.*

Chesapeake

CHESAPEAKE Chapter of the A.F.A. held a bang up meeting Dec. 4 at the Engineers Club, Baltimore, with more than 100 members and guests in attendance. Chapter President J. E. Crown presided and the speaker was Harry W. Dietert, Harry W. Dietert Co., Detroit. Mr. Dietert showed a number of slides which explained the operation of the dilatometer and discussed the use of various additions of material to sand to prevent cracking and burning in of cores. He pointed out that control of core sand under actual working temperatures is essential to good castings, and heaps should be checked constantly to insure the mixture is consistent.—*Frederick K. Bruggman.*

Central Indiana

TWO speakers were featured at the Dec. 7 meeting of the Central Indiana Chapter of the A.F.A. held at the Washington Hotel, Indianapolis. B. P. Mulcahy, Citizens Gas & Coke Utility, and chairman of the chapter presided, and approximately 115 members and guests were present for the meeting.

M. J. Gregory, manager of the foundry division, Caterpillar Tractor Co., Peoria, Ill., and Zigmond Madacey, superintendent of the core department of that company, were the speakers. Mr. Gregory talked on the foundry industry in general, making many constructive recommendations on what the foundry industry should do, and at the same time looking forward to the future of cast metals. Mr. Madacey discussed core blowing, covering the subject thoroughly and augmenting his discussion with samples of cores and castings, as well as slides describing in detail core blowing processes.

Robert E. Kennedy, secretary of the American Foundrymen's Association, Chicago, also was on hand for the meeting and spoke briefly.

Refractories, special and otherwise, came up for their share of attention at the Jan. 4, 1943 meeting of the Central Indiana Chapter of the A.F.A. which was held at the Washington Hotel, Indianapolis. Richard H. Bancroft, Perfect Circle Co., New Castle, Ind., and vice chairman of the chapter presided; 65 members and guests were present.

Principal speaker was Robert W. Knauft, sales manager, Charles Taylor Sons Co., Cincinnati, who discussed refractories, their uses in cupolas, electric furnaces and other types of melting equipment. Mr. Taylor took each phase of the subject as a unit and discussed them separately, illustrating his talk with slides.

Saturday, Dec. 19, was the date of the annual Christmas party of the Central Indiana Chapter of the A.F.A., which was held at the Washington Hotel, Indianapolis, with approximately 80 in attendance. A. E. Murphy, Hickman, Williams & Co., was chairman of the party. Considering the weather conditions which were very bad, the party was well attended.

Next regular meeting of the chapter will be held Feb. 1, at the Washington Hotel, Indianapolis. H. E. Baughman, manager, coke plant, Wheeling Steel

HAUSFELD

MAGNESIUM MELTING FURNACES

Part of a Battery of 30 Hausfeld Magnesium Melting Furnaces now 100% on Defense Work.

ON THE FIRST LINE OF THE NATIONAL DEFENSE

Hausfeld Furnaces are stepping up production wherever non-ferrous alloys are required for defense work. • Faster melting accounts for some of this increase. Reduction of metal losses accounts for much of it. Heat after heat, day after day, the alloys are of uniform analysis. Rejects are few. Operation is continuous. • Thousands of foundrymen have approved the accuracy of Hausfeld machine work, the complete utilization of fuels, the longer life of linings, pots and crucibles, the greater ease and speed of charging and discharging. • Every Hausfeld Furnace, whether single or multiple burner, stationary or tilting, covered or open-top, whether for melting magnesium or other non-ferrous metals, is tested before it leaves the factory.

The Campbell-Hausfeld Co.

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Corp., Wheeling, W. Va., will be the principal speaker, and he will discuss, 'Coke and By-Products."—*Ralph A. Thompson, secretary.*

E. Canada - Newfoundland

SPEAKER at the Nov. 19 meeting of the Eastern Canada-Newfoundland Chapter of the A.F.A., which was held at the Mount Royal Hotel, Montreal, was Harry W. Dietert, Harry W. Dietert Co., Detroit, who discussed, "The Behaviour of Molding Sands and Cores at Elevated Temperatures". This was accomplished by three rolls of film showing action of heat on various types of cores.

Chairman C. C. Brisbois, Robert Mitchell Co. Ltd., Montreal, announced that six additional members had been enrolled and the names would be brought up for acceptance at the December meeting. He thanked the Canadian Foundry Supplies & Equipment Co. Ltd. for supplying the program of the evening. Stating that it is the desire of the directors to have the full co-operation of each and every one of the members to procure additional members for the chapter, Mr. Brisbois pointed out that only by close co-operation of the members and officers will the desired increase of membership be obtained.

In thanking Mr. Dietert, Mr. Cartwright stated that as a scientist and a man who has devoted his life to the interest of foundry work. Mr. Dietert has contributed many original and helpful practices for those interested in foundry work.—*Robert E. Cameron.*

GATES and RISERS in any metal

in far Less Time with

Tannewitz METAL CUTTING BAND SAWS

Variable Speed

Models to fit Every Need

n addition to our regular High Speed Band Saws delivering over 2 miles of smooth vibrationless saw travel per minute, which have proved so exceedingly popular in automotive and aviation work, the TANNEWITZ line now offers five other models to provide the fastest cutting medium for every foundry need: a 30" machine to provide any speed from 300 to 900 blade feet per minute—a similar machine with 3-step V-belt drive to give 2300, 3100, 4000 blade feet per minute—a 36" machine with 32" capacity under the guide—a model with 48" wheels and one with 52" wheels, operating at 3,000 blade feet per minute for handling extra large castings. Get a line on the TANNEWITZ metal cutting band saw that fits your particular needs. It will save time, step up production and repay its cost dozens of times. Write for full particulars NOW!

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

Western Michigan

SECOND annual Christmas party of the Western Michigan Chapter of the A.F.A. was held at the Ferry Hotel, Grand Haven, Mich., Dec. 14. Following a delicious turkey dinner, Frank Fisher led the group in community singing. The chapter was happy to have present Robert E. Kennedy, secretary of the A.F.A., who spoke briefly on chapter activities.

Vice chairman of the chapter, A. E. Jacobson, Grand Haven Brass Co., Grand Haven, Mich., sprang the surprise of the evening by introducing his son, Ensign Charles Jacobson, who was home on furlough from a battle off the Solomon Islands. Ensign Jacobson gave a thrilling talk of his experiences. Those present will long remember the exciting experiences which he reviewed. Twelve fine door prizes ranging from fishing tackle to world globes were awarded to the lucky ticket holders. To conclude the evening's entertainment, a fine floor show was presented.—*K. C. McCready, secretary.*

Southern California

ANNUAL stag party of the Southern California Chapter of the A.F.A. was held Friday, Dec. 11. The banquet was presided over by president of the chapter, Earl Anderson, Enterprise Iron Works, Los Angeles, and was attended by approximately 550 members and friends. Everyone sojourned to the large lodge to enjoy Hollywood's best stag show under the direction of Richard Hughes, chairman of the Southern California Chapter's entertainment committee. The grand time enjoyed by all took everyone's mind off gas rationing and OPA problems.—*E. M. Hagener, secretary.*

Northeastern Ohio

SEVERAL factors were responsible for an exceptionally large attendance at the Jan. 10 meeting of the Northeastern Ohio Chapter, A.F.A., in the Tudor Arms hotel, Cleveland. Chairman Jack Tressler presented plaques to representatives of the foundries and pattern shops whose apprentices won prizes in the molding and patternmaking contest held in connection with the A.F.A. convention and exhibition, April 20-24, last year in Cleveland. In addition to the local and national prizes won by boys listed in first, second and third place, the chapter presented each boy taking part in the contest from the Cleveland district, with a year's subscription to THE FOUNDRY.

The usual technical session was pre-

sented as a quiz program that held the close attention of the members from beginning to end. Chapter vice president J. G. Goldie, foundry instructor, Cleveland Trade School, submitted the questions to his group of four experts, comprised of R. G. Wieland, foundry superintendent Forest City Foundries Co.; H. M. Oehling, core room superintendent, National Malleable & Steel Castings Co.; W. C. Manwell, foundry superintendent, Fulton Foundry & Machine Co.; F. J. Grondie, foundry superintendent, City Foundry Co. The ease and nonchalance and occasional flashes of wit and humor, with which the experts took up the questions and disposed of them to the apparent satisfaction of one and all, bore a remarkable resemblance to the performance of the outstanding group on the familiar *Information Please* radio program. From a factual point of view the performance of the local group was better than that of their famous rivals. Not once during the one and one half hour session was there necessity to ring up the cash register for a $50 war bond and a full set of the Encyclopedia Americana. At the close of the program the members voted enthusiastically for another quiz night at a later date.—*Pat Dwyer.*

Wisconsin

ANNUAL Christmas party of the Wisconsin Chapter of the A.F.A. was held Dec. 18 at the Schroeder Hotel, Milwaukee. More members and guests were on hand to enjoy the fun than at any previous Christmas gathering sponsored by the chapter. Following dinner a tantalizing floor show was presented. Committee in charge of the affair included: D. W. Thiem, chairman, Raymond H. Queeman, Seward Shaver, Charles Fuerst, Leo Koenig, R. A. Smith.—*George W. Pendergast, chairman, publicity.*

Western New York

DEOXIDATION of carbon and alloy steels was the topic discussed at the Dec. 4 meeting of the Western New York Chapter of the A.F.A. at its regular meeting held at Hotel Touraine, Buffalo, with Chairman Ralph T. Rycroft, Jewell Alloy & Malleable Co., Buffalo, presiding. There were 70 members and guests present.

Principal speaker of the meeting was Walter Crafts, research metallurgist, Electro Metallurgical Corp., Niagara Falls, N. Y., who was introduced by Theodore Burke, metallurgist, Otis Elevator Co., Buffalo, and in his introduction, pointed out that Mr. Crafts attended Yale and Massachusetts Institute of Technology, that he had prepared many papers on steel and its mechanical properties, and that his talk for the evening would deal with the deoxidation of cast steel, shrinkage, hot tears, ductility, etc. Mr. Crafts presented many valuable ideas

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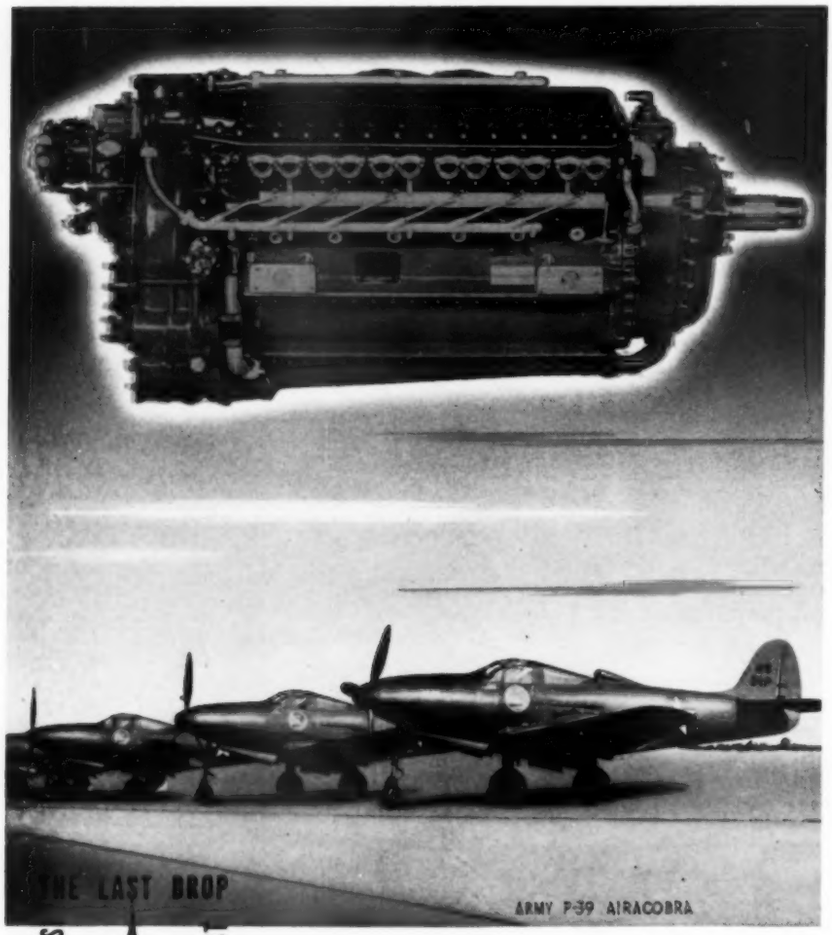
on fundamental reasons for deoxidizers. He showed sulphide and oxide diagrams, dealt with manganese and aluminum and the reduction of oxygen through additions of aluminum. Also discussed were galaxy type inclusions, and peritectic type inclusions. He pointed out that over reduced steel is sluggish and bessemer steel is fluid, and stated that high aluminum treatment will not be successful unless metal is thoroughly boiled first.

Chairman Rycroft called on committee chairmen for reports: Henry Sproull announced the annual stag party to be held Jan. 15 at Troop I Post, American Legion Club House, Buffalo; Harold Struebing reported on membership; William Miller discussed war problems; Frank Bates announced the following programs—February, the Rochester trip at which he stated he would like 50 or 60 members present from Buffalo, March meeting to feature Thom Barlow who will discuss alloy additions, April, a discussion of nonferrous problems, May meeting, open, and June meeting the chapter's annual picnic and election of officers.

A War Production Board meeting of all technical societies in the district was scheduled for Jan. 11, with afternoon and evening meetings. Approximately 1200 industrialists from western New York attended the meeting. The chapter's question and answer period was active and the meeting ran 25 minutes overtime due to the number of interesting discussions by the members.—*John R. Wark, secretary.*



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Michiana

REGULAR meeting of the Michiana Chapter of the A.F.A. was held Dec. 1 at the Hotel LaSalle, South Bend, Ind., with 55 members and guests present. H. Klouman, Michiana Products Corp., Michigan City, Ind., and chairman of the chapter presiding. C. F. Carson, National Supply Co., Toledo, was the principal speaker and was introduced by Mr. Klouman. His talk covered the full scope of jobbing foundry work, dealing especially with large castings. The discussion ranged from patternmaking, types of sand, methods of ramming, thickness of metal sections, types of facing, methods of skimming, types of flasks, types of cores, methods of drying, methods of gating, and using feeding heads. After the presentation, there was a round table discussion with all members taking part. Although the meeting was adjourned at 10:20, many men stayed afterwards to discuss the subject further with Mr. Carson.

Robert E. Kennedy, of the national office was present and discussed the scope of the work of the A.F.A. chapters, both in the United States and Canada. He presented a circular in which the WPB is seeking information relative to the use of gray iron castings at high temperatures.

Next meeting of the chapter will be held Jan. 5 at Hotel LaSalle, South Bend. —*K. H. Barnes.*

Chicago

GROUP meetings are proving popular with the Chicago Chapter, of the A.F.A., this year. The second in the 1942-43 program was held at the Chicago Bar Association, Jan. 4, and pegged up another excellent attendance of over 200. Five roundtables were conducted simultaneously by the steel, gray iron, malleable iron, nonferrous and pattern divisions.

Surprising is the interest being shown in the pattern and nonferrous divisions. The pattern group, newly organized this year, had the largest turnout, as was the case at the first group meeting two months ago. Of equal significance is the renewed vigor being displayed by the nonferrous division which was completely reorganized at the beginning of the year.

The steel division devoted its attention to "Heat Treating and Heat Treating Equipment," with H. A. Forsberg, general superintendent, Continental Roll & Steel Foundry Co., East Chicago, as chairman, and J. M. Ingram, superintendent of heat treating of the same company, as discussion leader.

R. G. McElwee, manager, foundry division, Vanadium Corp. of America, Detroit, led discussion on "Material Sub-

stitutions" before the gray iron division. H. K. Briggs, sales metallurgist, Miller & Co., Chicago, was chairman.

Topic for the malleable iron division was "Inspection Problems in Meeting Specification QQI-666," with Leon J. Wise, manager of industrial sales, Chicago Malleable Castings Co., Chicago, as chairman, and Cecil Semrau, metallurgist, Illinois Malleable Iron Co., Chicago, as discussion leader.

"Specifications and Inspection" was the subject for the nonferrous division, with A. P. Alexander, Chicago Ordnance District, Chicago, as discussion leader, and Chester Faunt, Christensen & Olsen Foundry Co., Chicago, as chairman.

The pattern division had as its topic the "Maintenance of Patterns and Pattern Equipment," with James Gammie, American Steel Foundries, East Chicago, Ind., and Andrew Hayes, pattern foreman, Whiting Corp., Harvey, Ill., as discussion leaders, and H. J. Swanson, Swanson Pattern & Model Works, East Chicago, Ind., as chairman.

In his comments before the gray iron group, Mr. McElwee stated that current foundry problems, created largely by the war, are more often problems of foundry management rather than metallurgy. Some of these difficulties arise from the attempt to produce castings of wide variance in size, section and chemical composition. Unless facilities are ample to make these castings as separate jobs, without altering cupola runs, troubles are sure to occur in the iron when shifting from one analysis to the other. Foundries would do well, he said, to take on only war jobs which are similar in character.

The speaker was unable to suggest a complete remedy for critical shortages in good scrap and alloying elements, but he was of the firm opinion that much can be accomplished through more judicious use of all elements and a better understanding of their functions. In many cases, he maintained, foundrymen are supplying higher tensile strengths in war gray iron castings than is required. For example, it is not good management to make 50,000-pound tensile castings where 40,000 pounds is sufficient. Problems in molding, melting, pouring, and physical properties, mount as strengths increase. Mr. McElwee asserted that foundrymen are not taking full advantage of the possibilities to be derived through the flexibility between carbon and silicon contents in plain gray iron castings. Tendency is to hold carbon down and boost silicon. Some surprising results can be obtained by letting carbon rise and dropping silicon.

Looking ahead to postwar, Mr. McElwee predicted that competition will be tremendous and foundrymen will be obliged to sell their product on a sound engineering basis. He predicted further that the heat treatment of gray iron holds unlimited possibilities in fitting castings to construction demands and that foundry operators would do well to familiarize themselves with heat treating principles and what can be accomplished through use of the process.

Next meeting of the chapter will be

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held Feb. 1, with W. E. George, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., speaking on "Plant Protection, Safety and Good Housekeeping."—*Erle F. Ross.*

Meet in Buffalo on War Production

Approximately 1200 foundrymen, engineers, and other interested individuals in Western New York met Jan. 11 at the Statler hotel, Buffalo, to participate in a War Production Conference. The Western New York Chapter of the A.F.A. was one of the various organizations sponsoring the meeting, and arranged that portion of the program relating to the foundry field. William S. Miller, Chas. C. Kawin Co., Buffalo, and chairman of the foundry session, called the group of about 80 together at 8:45 p.m. for discussion of their problems.

Meeting was opened by presentation of a short paper by Charles O. Burgess, Union Carbide & Carbon Co., Niagara Falls, N. Y., on "Alloys in Cast Iron Practice." At the conclusion of the paper a lively discussion period was held. Next speaker on the program was Martin W. Pohlman, Pohlman Foundry Co., whose subject was "Scrap Conditions in Gray Cast Iron," and an interesting discussion followed. Third topic was on "Malleable Cast Iron and the Part It Is Playing in the War" which in absence of the scheduled speaker, Fred Wurscher, Acme Steel & Malleable Iron Co., was presented by James H. Lansing, Malleable Founders' Society, Cleveland.

Following the discussion on malleable cast iron John McCallum, McCallum-Hatch Bronze Co. Inc., gave an interesting talk on nonferrous castings. Final speaker on the program was Thomas W. O'Hara, Symington-Gould Co., Depew, N. Y., who presented many highlights on steel castings.

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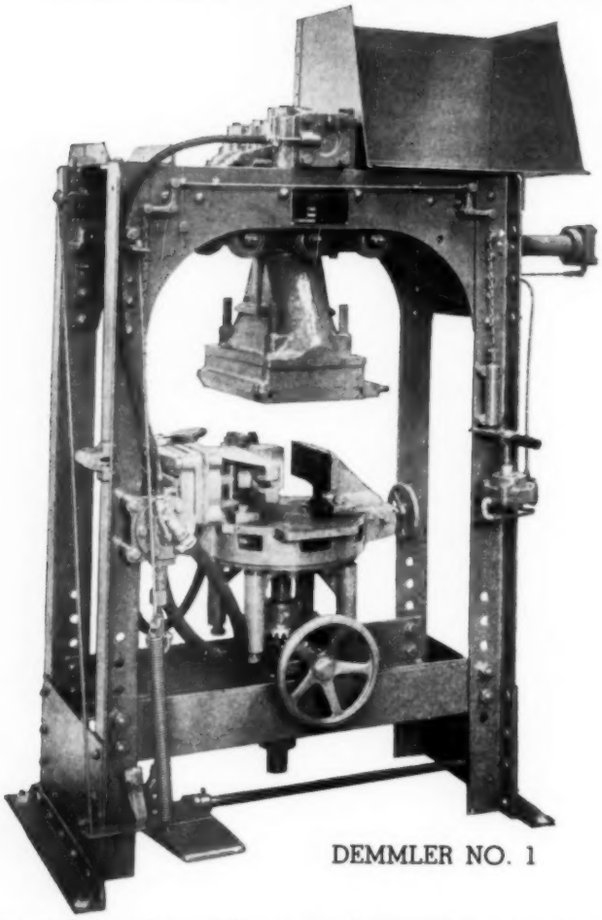

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Study Problems at War Conference

Problems bearing on the production of ferrous and nonferrous castings came in for animated discussion at the foundry panel held at the Pennsylvania Hotel in New York City, Thursday evening, Jan. 7, in connection with the War Production conference, sponsored by the American Foundrymen's Association and 11 other national technical organizations at the request of the War Production Board.

With James S. Vanick, International Nickel Co., New York, and chairman of the war problems committee, Metropolitan Chapter, American Foundrymen's Association, presiding, the foundry session was divided into four groups. E. D. Roberts, metallurgist, American Steel Castings Co., Newark, N. J., served as discussion leader for those interested in steel castings; A. McIntosh, foundry supervisor, Wright Aeronautical Corp., Paterson, N. J., aluminum and magnesium; W. E. Paulson, president, Thomas Paulson & Son, Brooklyn, brass and bronze; and J. W. Reid, manager, R. Hoe & Co., Dunellen, N. J., gray iron.

Discussions were held simultaneously, with major interest in aluminum and magnesium, for of the more than 50 foundrymen present, fully half attended the discussions on the casting of these metals. The session lasted about an hour. K. A. Delonge, International Nickel Co., served as secretary.

Approximately 1000 attended the conference dinner, with many others coming in later to attend the various panel sessions, which included ordnance inspection, manpower, machine shop problems, chemical plant equipment, metallurgical problems and welding.

L. R. Boulware, assistant to William L. Batt, vice chairman, War Production Board, Washington, was the featured speaker at the dinner, serving in the absence of Mr. Batt, who was unable at the last minute to attend. R. E. Gillmor, president, Sperry Gyroscope Inc., Brooklyn, presided as toastmaster.

Outlining the program ahead for this year, Mr. Boulware said that this country

would build 100,000 airplanes in 1943, which, he added, "will be the equivalent of about 200,000 planes as we are used to thinking of them." Motors for these planes will generate approximately 350,000,000 horsepower, more than 15 times as much power as all the ships in the United States Navy could generate today and equivalent to about 1½ times the power of all installed power plants throughout the world.

This year twice as much freight will be handled by the railroads as in the boom year of 1929, with substantially the same amount of rolling stock. To provide means for transportation of men and supplies to fighting fronts, 3000 to 10,000 miles distant, ships will be built during the current year equal to almost half the number in the world today, he said.

Approximately $180 billion in goods and services will be produced this year, of which $100 billion will be for war purposes alone. This leaves, so he pointed out, 44 per cent of the effort to support the country's standard of living. But at that, he added, this standard will be better than any other country ever experienced even in peace time. In Germany, just before the war, only 25 to 30 per cent of the country's total in goods and services was going to civilian needs. By this time, he was sure, even this percentage has been greatly reduced.

Wisconsin To Hold Annual Conference

Wisconsin Chapter of the American Foundrymen's Association has arranged for its sixth annual foundry conference to be held at the Schroeder Hotel, Milwaukee on Feb. 18 and 19. Outstanding speakers will conduct 23 technical sessions on topics of national importance to all foundrymen. From present indications, attendance at the coming conference will equal if not exceed attendance at any previous meeting, where the interest shown and the number of men in attendance have shown a gratifying increase year by year since the first event of the kind was held in 1938. The affair is a joint project of the Wisconsin Chapter of the A.F.A., and the University of Wisconsin.

Officers of the chapter include: President, G. K. Dreher, Ampco Metal Co. Inc.; vice president, Howard Waldron, Nordberg Mfg. Co.; treasurer R. F. Jordan, Sterling Wheelbarrow Co.; secretary, H. E. Ladwig, Allis-Chalmers Mfg. Co. Directors of the chapter include: F. A. Pritzlaff, Falk Corp.; D. C. Zuege, Sivyer Steel Casting Co.; William Hambley, Allis-Chalmers Mfg. Co.; John Bing, A. P. Green Fire Brick Co.; Robert C. Woodward, Bucyrus Erie Co.; E. B. Hansen, Wisconsin-Appleton Co.; A. C. Ziebell, Universal Foundry Co., Oshkosh, Wis.

The program for the conference is under the direction of Chapter President George K. Dreher, with William Hambley as chairman and John Bing as co-chairman. F. L. Waldenmeyer, A. J. Lindemann & Hoverson Co., Milwaukee, is conference secretary.

The program follows:

Thursday, Feb. 18

9:00 a.m. Registration and Get-together. Movies will be shown in the movie room.

12:00 noon Luncheon. Chairman, Dr. J. F. Oesterle, University of Wisconsin; welcoming address, F. E. Johnson, dean, College of Engineering, University of Wisconsin; keynote address, President Dystra, University of Wisconsin.

2:00 p.m. Gray Iron—*Conservation of Refractories by Correct Use*, C. E. Bales, chairman, refractory committee, A.F.A., and president, Ironton Firebrick Co., Ironton, O.

Malleable—Symposium on *Manufacture of Malleable Iron Castings for Army and Navy*, Chairman, L. D. Harkrider, president, General Malleable Corp., assisted by local malleable executives and representatives of Army Ordnance and Navy Inspection.

Nonferrous—*Silicon Bronze.*

Patterns—Symposium on *Construction and Checking of Patterns.*

Steel—*Use of Boron in Steel, and Its Effects on Physical Properties and Machinability.* N. F. Tisdale, Molybdenum Corp. of America, Pittsburgh.

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3:40 p.m. Gray Iron—*Inoculations, Their Uses and Effects*, Tom Barlow, Vanadium Corp. of America.
Malleable—Symposium on *Manufacture of Malleable Iron Castings for Army and Navy*, continued from first session.
Nonferrous—*Salvage and Welding of Nonferrous Castings.*
Patterns—*Construction and Checking of Patterns*, continued from first session.
Steel—*Spinning Steel Castings*, C. E. Westover, executive vice president, American Foundrymen's Association, Chicago.
6:30 p.m. Main Banquet—Speaker to be announced later.

Friday, Feb. 19

9:00 a.m. Gray Iron—*Gates and Risers*, Pat Dwyer, THE FOUNDRY, Cleveland, author of the book, "Gates and Risers" and well known authority on the subject.
Malleable—Symposium on *Eliminating Problems in Malleable Foundries*. Chairman, L. D. Harkrider, assisted by local malleable foundrymen and James H. Lansing, Malleable Founders Society, Cleveland.
Nonferrous—*Aluminum Alloys and Heat Treatment.*
Steel—*Inspection*, an inspector's viewpoint of how castings should be prepared.
10:30 a.m. Gray Iron—*Heat Treatment of Cast Iron.*
Malleable—Symposium on *Eliminating Problems in Malleable Foundries*, continued from previous session.
Nonferrous—Scrap Clinic.
Steel—*Gates and Risers.*
12:15 p.m. Luncheon—Speaker to be announced later.
2:15 p.m. Joint session of all groups—*Behavior of Sand and Cores at Elevated Temperatures*, Harry W. Dietert, Harry W. Dietert Co., Detroit.
3:40 p.m. Gray Iron—*Core and Molding Sand Practice.*
Malleable—*Increased Use of Malleable Iron during and after the War.*
Nonferrous—*Core and Molding Sands*, Harry W. Dietert, Harry W. Dietert Co., Detroit.
Steel—*Control of High Temperature Physical Properties of Cores*, F. B. Riggan, Key Co., East St. Louis, Ill.

Birmingham To Hold Annual Meeting

Birmingham Chapter of the A.F.A. will hold its eleventh annual meeting on Feb. 19 at the Tutwiler Hotel, Birmingham, Ala. The program committee has arranged three technical sessions which will be held in the afternoon, and they will be followed by the annual banquet to be held in the evening.

Registration for the meeting will be at one o'clock, and the first session on "The Role of Iron and Steel Castings in Ordnance Materiel" will begin at 2:30 p. m. The second session starting at 3:45 p.m. will be devoted to "Research and Development of High Grade Refractories" with R. A. Barr, Refractory Division, Carborundum Co., Perth Amboy, N. J., as the speaker. Final technical session will be held at 5 p. m. and the subject will be "Conversion From Production Work to War Work".

The annual banquet will be held at 7 p. m. with Warren Whitney, National Cast Iron Pipe Division, James B. Clow & Sons, Birmingham, Ala., as toastmaster. Principal speaker will be Earl L. Shaner, president, Penton Publishing Co., Cleveland, publisher of THE FOUNDRY.

Municipal Castings Are Studied

A meeting of those interested in the subject of municipal castings, such as manhole rings and covers, was held at the Lotos Club in New York on Dec. 21. There was a good attendance and the meeting was presided over by R. E. Moore, president, Flockhart Foundry Co., Newark, N. J., who is chairman of the Municipal Casting Committee of the Gray Iron Founders' Society.

The matter of the restrictions of conservation order M-126 was discussed at length and plans laid to bring to the attention of the WPB authorities the various special types of manhole frames and covers which would be difficult to produce satisfactorily in the proposed substitutes of reinforced concrete and wood. It is intended by the Gray Iron Founders' Society to make this Municipal Casting Committee permanent.

On Dec. 26, restrictions of M-126 were lifted to permit the use of gray iron for Army, Navy and Maritime Commission orders. Municipalities, states et cetera can be served through the medium of PD-500.

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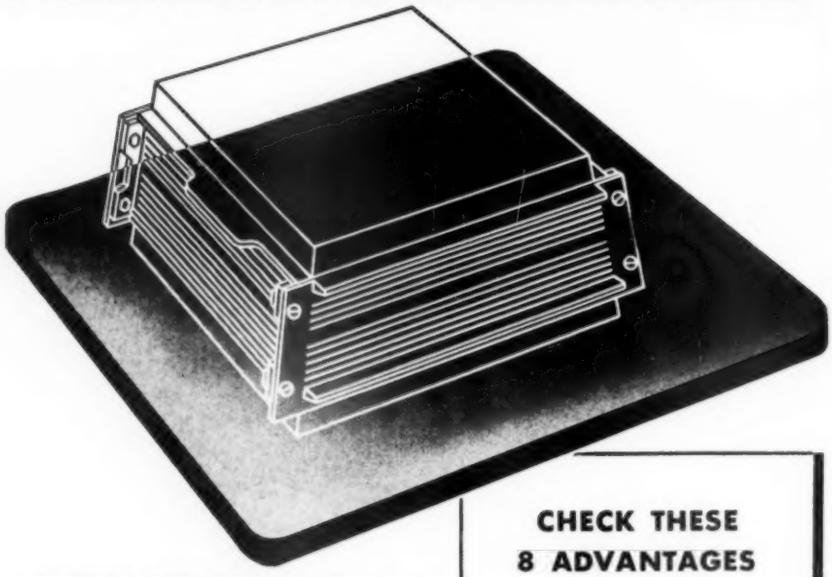

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Obituary

MABON P. Roper, 50, president and director, George D. Roper Corp., Rockford, Ill., died in Rockford, Dec. 10, following an illness of several weeks. Mr. Roper was the son of George D. Roper, pioneer gas range manufacturer and founder of the company.

* * *

William A. Crotty, 68, sales manager, Central Foundry Co., New York, died in Yonkers, N. Y., Dec. 14.

* * *

George W. Heald, chief engineer, Ramtite Co., a division of S. Obermayer Co., Chicago, died Nov. 16, in that city.

* * *

Frank Michelbach, 63, secretary-treasurer, Temple Foundry Inc., Alexandria, Va., died at his home in Alexandria, recently.

* * *

James Long, 66 formerly president and general manager, Western Malleable Casting Co., Los Angeles, died in Los Angeles recently.

* * *

William Wood, 76, superintendent for 40 years of the former G. A. Gray Co., Cincinnati, died at his home at Price Hill, Cincinnati, recently. Mr. Wood was born in Scotland and came to the United States at the age of 18.

* * *

John H. McKelvey, 61, vice president, Laclede-Christy Clay Products Co., St. Louis, died in St. Louis Dec. 16. Mr. McKelvey had been associated with the Laclede-Christy company 39 years. He started as a junior clerk and telephone boy with the Christy Fire Clay Co., predecessor of the present company in 1903.

* * *

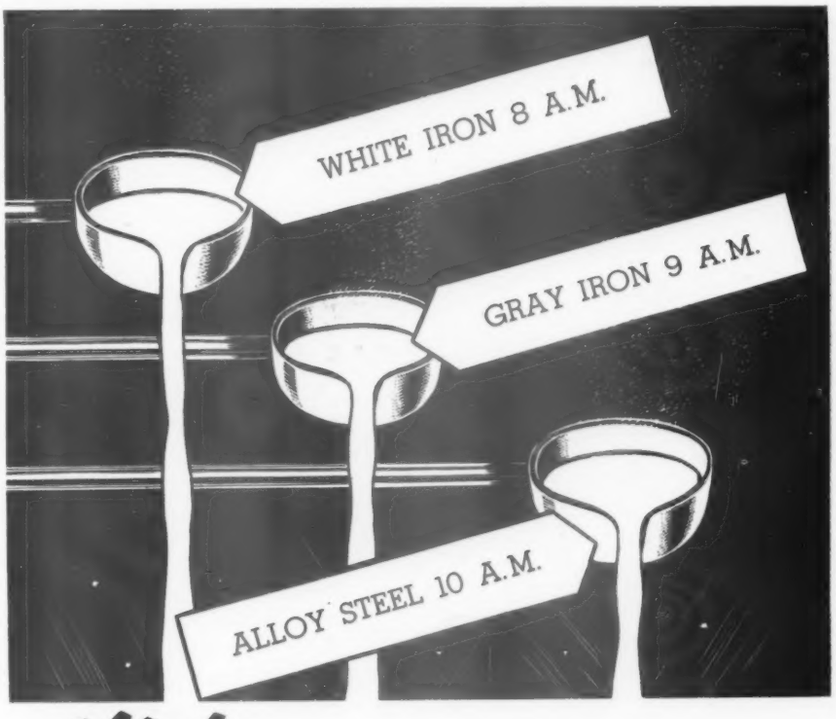
Philip C. Geoghegan, 68, retired foundry manager, Ohio Foundry Co., Cleveland, died Jan. 11 at his farm near Novelty, O. Mr. Geoghegan was born in Manchester, England, and went to Cleveland as a boy. He had been employed by the Ohio Foundry company for 43 years prior to his retirement 5 years ago.

Manganese Bronze

Procurement Division, Treasury Department, Washington, has issued federal specification QQ-B-726b for Manganese Bronze Castings which supersedes QQ-D-726a dated April 16, 1938. The new specification provides 3 classes of castings A, B and C. Class A contains 55 to 60 per cent copper, 1.50 per cent maximum aluminum, 1.50 per cent maximum manganese, 0.40 to 1.50 per cent iron, 0.50 per cent maximum tin, 0.40 per cent maximum lead, 0.50 per cent maximum nickel, and remainder zinc. Classes B and C contain 60 to 68 per cent copper, 3.0 to 7.5 per cent aluminum, 2.5 to 5.0 per cent manganese, 2.0 to 4.0 per cent iron, 0.50 per cent maximum tin, 0.20 per cent maximum lead, and remainder zinc. Tensile and yield strength requirements for class A are 65,000 and 25,000 pounds per square inch; for class B 90,000 and 45,000 pounds per square inch, and for class C 110,000 and 60,000 pounds per square inch.

Receive WPB Medal

Ten winners selected from industry by the War Production Board were awarded gold medals and citations for production merit by President Roosevelt, Dec. 10 and 11. Among those was Joseph H. Kautsky, 65, who is employed at the Dodge plant, Link-Belt Co., Indianapolis. The gold medal which Mr. Kautsky received from President Roosevelt represents national recognition for four technical suggestions permitting higher speeds in grinding and machine operations.



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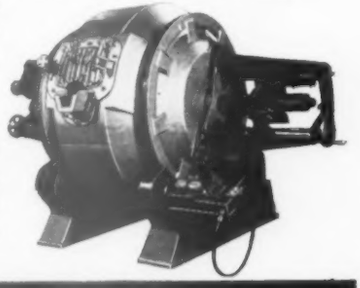

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KUHLMAN ELECTRIC COMPANY • BAY CITY MICHIGAN

FOUNDRY COMMENT

HAVE you noticed that the Gray Iron Founders' Society now has a Foundry Doctor? The plan was developed by the society as a means of assisting individual gray iron foundries to improve operations and product, eliminate waste, and sell quality castings rather than pounds of cast metal. After considerable study the society has prepared a thorough inspection formula, purchased the necessary equipment, and engaged competent personnel to offer a thorough and complete unbiased inspection of a gray iron foundry. Following this inspection, the society will render a detailed report on equipment and operations, diagnose trouble and recommend proper remedies. The service is being made available at a modest fee to members of the society, and at a higher fee to non-members. I feel that this is a most practical service which should be grabbed by many gray iron foundries. Before long, the line will be forming at the right.

—□—

A recent pamphlet of the OPA presenting interpretations of specific price schedules and regulations gives the following information on maximum price regulation 125 on nonferrous foundry products:

Applicability—finished parts—subcontracts. If machining cost constitutes 25 per cent or less of the total cost of the rough casting plus the cost of machining, nonferrous castings sold by a foundry are subject to the Regulation even though the castings are finished parts for combatant items and are made pursuant to a government subcontract.

Price Determination—foundry purchased after base period. A new company, regardless of whether it is a transferee of a concern that sold nonferrous castings, is required to calculate its maximum prices under Section 1395.11 (b), and not under 1395.11 (a).

Definitions—"semi-permanent." Plaster and cement molds used but once and then discarded are "semi-permanent" molds under the definition. As here used, "semi-permanent" does not refer to the number of castings for which a mold is used, but to its permanence of form when used in the casting process.

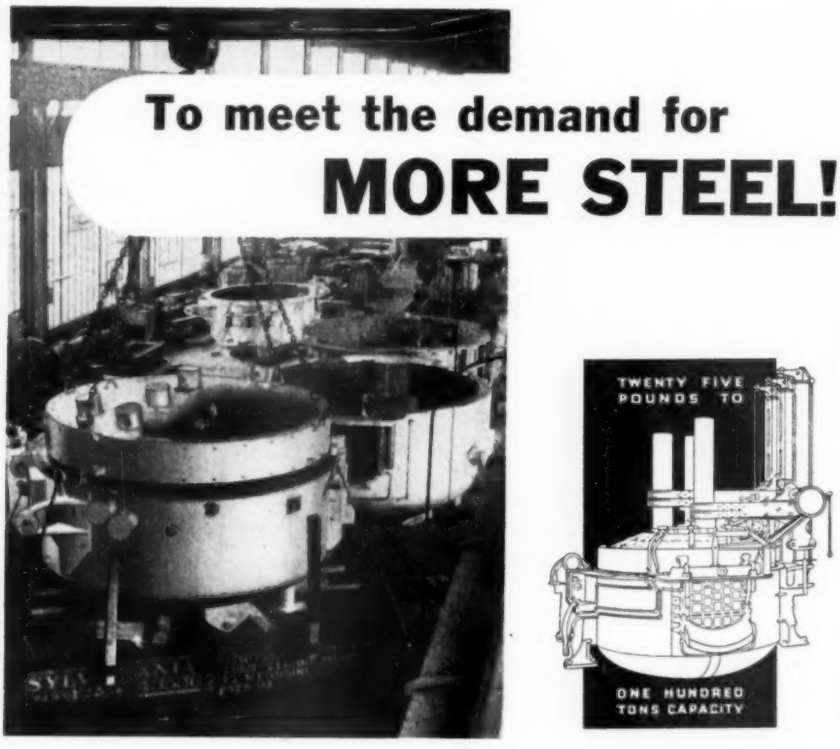
—□—

Gray iron foundries whose net sales during 1942 totaled $40,000 or less, recently were excluded from price control by the OPA. The ruling also provides sellers with an alternative method for establishing maximum prices for castings not sold during the base period, extends the time of filing of pricing methods and cost records, and supplements record-keeping requirements of the regulation.

Malleable foundries have been provided with an alternative method for determining maximum prices for certain malleable castings. Instead of using a pricing formula, the seller may employ as the maximum the price at which he last contracted or agreed to sell the same or a substantially similar one before Oct. 1, 1941.

—□—

Allocations order M-2-b recently was simplified by the WPB to bring it in line with the form of allocation orders now generally issued. The amended order eliminates all references to preference ratings, since the supply of magnesium and magnesium products is allocated directly to users. Provision also is made by the amended order for more strict segregation of scrap by owners or generators.



Shop view of Lectromelt furnaces under construction.

MOORE RAPID *Lectromelt* FURNACES

Increasing numbers of Lectromelt Furnaces are going into 24 hour daily operation to produce more quality steel.

In addition to these new furnaces, the top charge feature of Lectromelts is also boosting the tonnage of electric steel departments, through improvements in design which permit more rapid charging of the furnace and less time between heats. Their use results in less power, electrodes and refractories.

Top charge type Lectromelts increase production and lower operating costs. Write for complete information.

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH, PENNSYLVANIA

Scrap must be segregated in accordance with the alloy designation of the A.S.T.M. It is believed that this requirement will facilitate handling and reprocessing of scrap magnesium.

—□—

Four foundries in the Philadelphia district are reported to have received a share of an order for 400,000 stoves recently placed by the government. Several other foundries seeking a part of this business were unsuccessful, according to the same report, because they were located in areas already heavily engaged in war work. Thus location rather than ability to produce becomes the measure of success in securing business. I wonder what is happening to the personnel of the light foundries when it is impossible to obtain war business, or a share in the essential civilian work. These men usually cannot be used in heavy shops without considerable additional training, and of course more training is necessary for work in other industries.

—□—

One of the most striking messages on the need for safety in war production was a recent advertisement of United States Steel headed "52,000 will die without fighting." These will die needlessly from preventable accidents, unless both labor and industrial leaders drive hard for greater safety. Take a look at that safety message.

—□—

Sometimes it seems harder to give up our hobbies than to go without meat. For example, just the other day I heard of a group of women meeting for luncheon to hear a so-called expert discuss "Antiques and the War".

—□—

Recently a trade publication crossed my desk which stated, "Make way for the General Shermans new welded M-4 tanks." While welding is a part of the job, the biggest part of the fabrication is being done by pouring molten steel in sand molds. I wish the foundry industry could dramatize its story of war service. Surely the materials are plentiful.

—□—

Don Reese recently made the statement that the 5000 cupolas available in foundries today, if operated 8 hours a day have a greater melting capacity than the entire annual output of the iron and steel industry of this country. The only trouble comes in finding a market for castings that thus can be produced.

—□—

J. Edgar Hoover, director, Federal Bureau of Investigation, U. S. Department of Justice, again warns industry on the dangers of sabotage. In his opinion, management must protect its plan with adequate mechanical devices, such as fire and burglar alarms; see that all fire fighting apparatus is in good workable condition; see that all employes are thoroughly acquainted with the location and use of fire fighting apparatus; select and investigate carefully the background of all employes; report suspicious fires or explosions immediately to the FBI, and maintain a continual inspection of the plant to see that it is protected adequately.

—□—

Department of commerce figures report steel castings production at 137,428 tons in November, compared with 149,268 tons in October and 103,963 tons in November, 1941. Declines were encountered in both railway specialties and miscellaneous castings, production of the former being the lowest since July, 1939.

Malleable production was 59,432 tons in November compared with 68,251 tons in October and 66,738 tons in November, 1941.

—□—

Twenty-four years ago this month the first "Bill" story appeared in THE FOUNDRY. Since that time, Pat Dwyer has written and Harry Richey has illustrated 444 stories, a marvelous record in the field of creative writing. Congratulations to both, and may "Bill" continue to philosophize for many years to come.

F. G. S.

PRECISION
METALLURGICAL
TESTING EQUIPMENT
AB LEAD LAPPING DISC for producing extreme flatness in polishing difficult metal specimens with a minimum of disturbed metal.
EYE SHADE MAGNIFIER—Large clear field—magnification 2¼ times. Quick change to normal vision by simply pushing up on forehead.
AB DE LUXE POLISHING MACHINE combines maximum convenience with precision polishing. Built in wash fountain—air blower for drying—desiccator compartment for sample preservation.
B. & L. WIDE FIELD BINOCULAR. Affords a wide field of realistic three-dimensional vision. Shown with B. & L. reflector lamp.
APLANATIC FOLDING MAGNIFIERS Single lens—4-power.
SPECIMEN MOUNT PRESS No. 1315, provides utmost ease and speed in molding and cooling bakelite and transoptic mounts, either 1" or 1¼" size. Built for extreme accuracy and long service.
Double lens type with 6- and 3-power lens. 9-power when combined.
B. & L. FOLDING MAGNIFIER in metal case. 7-power.
A complete line of equipment for the Metallurgical Laboratory . . .
SPECIMEN MOUNT PRESSES—POLISHERS—POLISHING ABRASIVES
POLISHING CLOTHS—POWER GRINDERS—BELT SURFACERS—CUT-OFF MACHINES—HAND GRINDERS—CARBON METERS—COLORIMETERS
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OPTICAL INSTRUMENTS ★ METALLURGICAL APPARATUS
228 North LaSalle Street, Chicago, Illinois

FOUNDRY ACTIVITIES

HEADQUARTERS of the Castings Division, Aluminum Co. of America, are being transferred from Cleveland to the main offices of the company in Pittsburgh. The great volume of war production being handled by that division has made the transfer desirable in order to simplify the transaction of administrative business. Casting production by the Aluminum Co. of America is currently 11 times what it was before the war, and production facilities still are being expanded.

* * *

Lacy Mfg. Co., 1000 North Main street, Los Angeles, is making improvements to its foundry building.

* * *

Wilkening Mfg. Co., Philadelphia, is constructing a new plant in Scranton, Pa., for production of piston rings for Army aircraft.

* * *

Hoosier Foundry Corp., Indianapolis, has been dissolved by decree of court.

* * *

So-Cal Foundry, 1895 East Sixteenth street, Los Angeles, is erecting an addition to its plant.

* * *

Paul Pufahl & Son Foundry Co., 2545 West Como avenue, St. Paul, is building a one-story foundry addition.

* * *

Pelton Steel Castings Co., 148 West Dewey place, Milwaukee, has plans for one-story factory buildings.

* * *

Wehr Steel Co., 5234 West Mobile street, Milwaukee, has let contract for a one-story factory addition.

* * *

St. Thomas Bronze Co., Wellington street, St. Thomas, Ont., plans further additions to its plant.

* * *

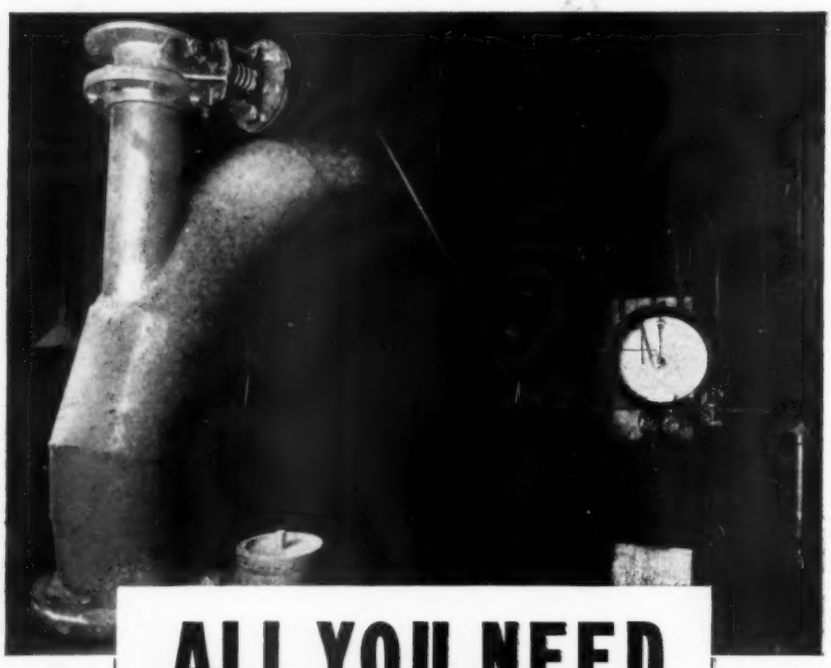
Index of new equipment orders for November, 1942, according to a report of the Foundry Equipment Manufacturers' Association, Cleveland, was 286.1 as compared with 552.2 in October. Index for repairs was 497.7. Index of 100 represents the monthly average of reported sales to metalworking industries during 1937 - 38 - 39.

* * *

Ohio Foundry Co., 9812 Quincy avenue, Cleveland, will celebrate its fiftieth anniversary in March. The company first was organized as the Schneider-Trenkamp Stove Co., and when that company sold out to the American Stove Co., the Ohio Foundry Co. was organized to carry on the foundry business. Officers of the firm include: William H. Smith, president; Henry Trenkamp Sr., secretary; J. C. Maher, treasurer; and Henry Trenkamp Jr., superintendent.

* * *

American Steel Foundries, Chicago, has acquired the business and plant of the Charles F. Elmes Engineering Works, 230 North Morgan street, Chicago. The Elmes company is one of the country's oldest manufacturers of hydraulic machinery, having been



ALL YOU NEED

to get Added Output instead of Pigging!

A simple, speedy installation like this is all you need to eliminate pigging losses!

A Foxboro Air Weight Control System controls the blast by *weight* of air, instead of volume . . . keeps heats uniformly hotter . . . makes every tap available for useful output. And does it automatically, regardless of weather conditions!

You'll get better castings, fewer rejects, savings in pouring time. Users also report higher iron-coke ratios and longer refractory life.

Write for detailed Bulletin B-268. Names of nearby users on request. The Foxboro Company, 32 Neponset Ave., Foxboro, Massachusetts, U.S.A. Branch offices in principal cities of United States and Canada.

FOXBORO Reg. U. S. Pat. Off. AIR WEIGHT CONTROLLERS

founded in 1851 to produce equipment for the Civil War. It will be operated as the Charles F. Elmes Engineering Works Division, American Steel Foundries, with Charles F. Elmes as manager.

° ° °

Joshua Hendy Iron Works, Sunnyvale, Calif., an affiliated company with the Henry J. Kaiser interests, has purchased the Pomona Pump Co., Pomona, Calif., and the three plants of that company in St. Louis, Mo. The Pomona Pump Co. was organized as the Pomona Mfg. Co. in 1902, and was reorganized in 1924 as the Pomona Pump Co.

° ° °

Westinghouse Electric & Mfg Co., Cleveland, plans improvements to its foundry building at 1216 West Fifty-eighth street.

° ° °

Dayton Bronze Bearing Co. recently moved to its new plant at 111 Front street, Dayton, O. The floor space has been doubled and new equipment added so that castings weighing up to 3000 pounds can be handled. Heat treated aluminum also is being produced. Arnold H. Israel is general manager.

° ° °

Warman Steel Casting Co., 6100 South Boyle avenue, Los Angeles, has awarded contract for construction of a new factory building.

° ° °

Aluminum Co. of America, 3311 Dunn road, Detroit, has completed plans for construction of two additions to its foundry.

° ° °

Lynchburg Foundry Co., Lynchburg, Va., is hiring women workers to replace nearly 100 men of the company who have joined the armed services.

° ° °

Advance Aluminum Castings Corp., 2742 West Thirty-sixth place, Chicago, has completed additions to plant capacity necessitated by war demands.

° ° °

Patch Foundry Inc., 815 West Van Buren street, Chicago, has been organized by H. L. Clink, J. J. Cuthbertson, A. Loewenberg.

° ° °

Acme Aluminum Foundry Co., 6843 South Bell street, Chicago, is undertaking a rehabilitation and expansion program to enlarge production facilities.

° ° °

J. McMeekan Co., Southern Rhodesia, Africa has been licensed to manufacture meehanite castings. The company is the ninth manufacturing firm to produce meehanite castings in South Africa.

° ° °

J. W. Gregg Foundry, Covert, N. Y., has been sold to John A. Murray, Geneva, N. Y. According to present plans Mr. Murray expects to operate the shop as a jobbing gray iron and aluminum foundry.

° ° °

Sterling Aluminum Products Inc., St. Louis, has purchased additional land in the vicinity of its plant which was acquired for possible postwar expansion.

° ° °

California Brass Mfg. Co., Ltd., 1447 Naud street, Los Angeles, has awarded contract for construction of a new foundry building at 208-20 Sotello street, Los Angeles.

AVOID CHILLING

with FRANKLIN *Liquid Hide* GLUE

An easy brush stroke thinly covering each segment is all you need when you use Franklin Glue. Plenty of time for assembly without fear of chilling. A foolproof glue the most inexperienced workman can use with top performance.

STOP WASTE — Franklin Liquid Hide Glue is ready to use the first thing in the morning and any overage at the end of the day can be used the next day. No heating, mixing or waste by souring or thinning.

"EVERY DROP WORKS"

MAKE YOUR OWN TEST—SAMPLE FREE

THE FRANKLIN GLUE CO., COLUMBUS, OHIO

PRODUCING MAGNESIUM CASTINGS

(*Continued from page* 80)

cover coating. The pots or crucibles used are examined several times a day to guard against break-outs. Any evidence of heavy scaling or of sagging or swelling usually indicates that the pot is approaching an unserviceable state, and it generally is wise to discard the pot at once rather than to take a chance. The sound or ring given when the pots are pounded with a heavy hammer will also indicate whether or not they are sound.

In case one of the smaller crucibles used for superheating breaks out in the furnace—it is put down in a pile of sand, and the metal is allowed to freeze. If a breakout occurs with one of the 2000-pound melting pots in the furnace, it is emptied as rapidly as possible into the smaller superheating crucibles containing some flux. In handling pots from the furnace to the mold side, or from one furnace to another, it is excellent precaution to use some type of safety catch on the ladle shank to eliminate the possibility of overturning the pot through accident. Pots are skimmed in definite locations with containers available for the skimmings.

Good housekeeping principles applied in the cleaning room will keep the danger of fire in that department to a minimum. The cardinal point in that program is to prevent accumulations of magnesium sawings, chips, etc. Practice at the American Magnesium Corp. is to sweep up five or six times or even oftener during a shift. That goes a long way in decreasing the fire hazard because any fire which might start will be so small that it can be handled efficaciously, and with dispatch. Also the benches, shelves, beams, ledges and window sash in the cleaning room are brushed down regularly to prevent accumulation of dust which may contain magnesium. Incidentally, finely divided material such as sawings, etc., should not be permitted to become moist and stand around, due to the possibility of spontaneous combustion.

Plan Every Step

As previously mentioned magnesium possesses certain characteristics wherein it differs considerably from other materials. Hence, to secure sound castings technical control and adequate supervision are essential for successful production. Every step in procedure must be planned in advance after careful consideration of all the factors involved, and once established must be followed without deviation until an approved change is made. In melting magnesium two considerations are of primary importance. One is to keep burning and consequent oxidation down to a minimum since the metal oxidizes easily just slightly above its melting point. The other is to send to the mold side a metal that is free from oxides and drosses, and which has received the proper treatment to provide the best properties in a casting.

Magnesium is melted at the American Magnesium Corp. in cast or fabricated steel pots or crucibles in oil-fired furnaces. Steel used for the pots may be low carbon or low alloy steel.

Previous mention has been made of the necessity of regular inspection of pots to insure soundness. Examination for scaling, sagging or distortion, and striking the pot with a heavy hammer and noting the ring aid in determining whether or not it is sound. Furnace settings are cleaned regularly to free them from iron scale dropping from the pots, since molten magnesium will combine rapidly with the scale to give a thermite reaction with an enormous

★

Speed War Production with

JIB CRANES

FASTER SAFER HANDLING AT LESS COST!

★ You will establish top efficiency—save man-hours—eliminate needless operations—reduce employee fatigue and promote real safety, when you spot and use these Jib Type Cranes at strategic points in your foundry.

No. 539
Swinging Bracket—Hand or Electric. ½ to 3 Tons and up to 20 ft. radius.

No. 541

No. 540

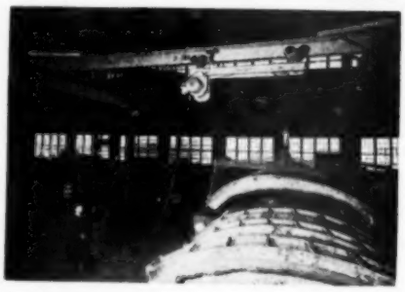
Let These "Mechanical Muscles" Increase Your Foundry Output

You can predetermine the time required for heating—casting—moulding—cooling—cleaning—inspection and other operations, but the "in-between" handling is the thing that can clip the cost sheet.

From induction of raw materials, through each foundry operation, to the loading of the finished product, you will find many places where these Pillar, Mast and Wall Type Jib Cranes can swing into action for greater foundry output.

WE URGE YOU—Ask us to send our latest circular showing the new and improved line of Chicago Tramrail Jib Mounted (Electric or hand-operated) Cranes. Make a quick survey of your present handling operations, and you'll be quick to locate production gaps that this equipment will span for more speedy operation.

WRITE TODAY—Without cost or any obligation, you will receive detailed descriptions of our new Jib Crane line plus more news on our Top Running Cranes.



Chicago Tramrail Furnace Crane at Work

CHICAGO TRAMRAIL COMPANY

2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

liberation of heat. Steel pots used for melting and handling molten metal vary in capacity from 75 to 2000 pounds. Usually pots above 400 pounds capacity are employed only for melting.

Magnesium is held at the American Magnesium Corp. in large tilting type cast steel pots, of 2000 pounds capacity at around 1300 to 1350 degrees Fahr. From that the metal is transferred to smaller pots in other furnaces where it is refined and superheated. Ordinarily, due to the lower casting yield in magnesium casting production, the metal charge consists of 20 per cent ingot metal and 80 per cent return scrap but may vary from 100 per cent ingot to 100 per cent scrap. Here again it is advisable to mention the desirability of using only abrasive blasted scrap to keep silicon pick-up to a minimum. For molten magnesium reduces the silica in molding and core sands. In charging the crucible a small amount of flux is placed in the bottom and then the ingot metal and scrap are charged with small sprinkles of flux so that the whole is well dusted. The flux is used primarily to provide a cover during melting, and is termed a liquid flux to distinguish it from the refining flux used later.

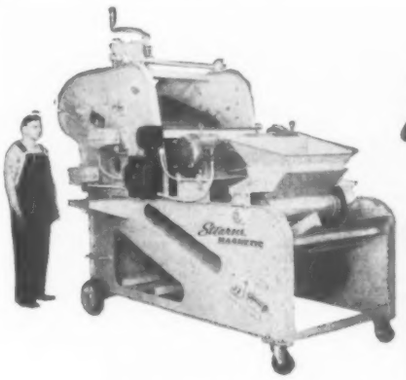
Dust Metal With Flux

The metal in the crucible is melted and brought up to a temperature between 1300 and 1350 degrees Fahr. as determined by a thermocouple. The molten metal then is poured into smaller capacity pots and transferred to smaller furnaces for further treatment. In pouring from the large crucible to the smaller ones the surface of the metal is sprinkled or dusted with refining flux so that exposure to the air is at a minimum. After the transfer to the smaller furnaces the metal temperature is raised to about 1350 degrees Fahr. as measured by a thermocouple, and then the refining flux is stirred well into the melt.

Stirring is accomplished with an iron rod bent to an L-shape with the length of one leg about equal to the depth of the crucible. Stirring is such as to give a smooth, uniform rotational movement of the bath rather than violent agitation. During the stirring operation more flux is added to insure a fairly heavy coating on the surface of the molten bath. Stirring is important and is performed conscientiously since it promotes an intimate contact between oxides and foreign materials in the bath and the flux so that they can be removed. There is no need to guess when refining has been performed properly since there are two rather definite end points indicating completion. One is the appearance of the flux. When first added the flux is liquid, but as stirring proceeds and the flux picks up the oxides, it becomes dry and crusty. The other indicator, and most important one, is the appearance of the metal. It is bright and silvery in color.

Following refining the flux and dross are removed, and a fresh flux coating is added. Then the temperature of the metal is increased to between 1600 and 1700 degrees Fahr. Heating magnesium at high temperature or superheating as it is termed, is essential in production of sound castings with the highest physical properties. While the exact mechanism or reaction which occurs in superheating is not known definitely, that treatment does produce grain refinement which improves mechanical properties of magnesium. It also is a necessary step to obtain a metal which will feed properly from the risers into the casting, and reduces to a minimum the tendency toward cracks.

When the magnesium has reached the desired superheating temperature, the crucible is removed from the furnace to permit skimming and reduction of the temperature to the desired pouring range. All that time the flux is dry and



Stearns MAGNETIC PULLEY SEPARATORS FOR Foundries and Smelter Plants

Separating brass, aluminum, babbitt and other secondary metals from iron turnings, borings and metal refuse in large capacity operations is most economically accomplished with Stearns Magnetic Pulleys or Pulley Type Separators.

Shown above is a double pulley separator installed in a large Eastern smelting plant, a unit easy to adjust, easy to load, readily moved about where needed—another of the many uses industry has found for lowering production costs—increasing the value of scrap.

Whether it be for sand reconditioning . . . protection against tramp iron in crushing or pulverizing . . . concentration . . . reclamation . . . separation — Stearns Magnetic Pulleys will provide maximum efficient trouble free service. In sizes to suit your application.

THE STEARNS POWERFUL AIR-COOLED MAGNETIC PULLEY

COMPLETE DATA IN BULLETIN 301. WRITE FOR IT.

Stearns

SEPARATORS DRUMS ROLLS
CLUTCHES BRAKES
SPECIAL MAGNETS

MAGNETIC MFG. CO.
662 S. 28th St. Milwaukee, Wis.

crusty. If it is not in that condition, the procedure has not been conducted properly—usually in that fresh flux has been added just a short time before the pot is pulled. Time should be allowed for the flux to thicken and dry since a fluid flux is extremely difficult to remove, and may be carried into the casting cavity with the molten metal. With the flux in the correct state, it is skimmed carefully from the surface of the bath. Particular pains are taken to see that the flux and dross are cleaned away from the pouring lip. During that operation a flux composed of 50 per cent sulphur and 50 per cent boric acid is sprinkled over the metal to prevent burning.

After skimming the temperature of the metal is ascertained by a thermocouple, and when it reaches that equal to the pouring temperature plus the temperature drop between melting department and mold side, the crucible is transported to the mold or molds to be filled. Gates, risers or pieces of ingot never are added to the crucible to hasten cooling since such additions will result in drossed or inferior castings. Before pouring is begun extreme care is taken to see that the flux is held back so that only a perfectly clean stream of metal will enter the mold cavity. That is accomplished by brushing or pushing back the flux carefully from the pouring lip. As the metal surface is exposed, it is dusted well with the sulphur-boric acid mixture, and pouring begun. As the metal flows from the crucible, the stream also is dusted well with the mixture which forms an envelope over it. Should a break occur in the envelope, it is dusted again to prevent access of air.

This is the first of a series of two articles relating to the production of magnesium castings. The second will appear in the March issue.

THE EDITORS.

Speed Your Production with SCHUNDLER BENTONITE

HERE'S why you can speed your production with Schundler Bentonite: (1) less sand is required, (2) castings are cleaner, (3) castings are more uniform and (4) there are fewer rejections. Moreover, Schundler Bentonite is always sold with a technical service fitted to your requirements.

The supply of Bentonite is ample. Prompt shipments can be made without priority ratings.

24 Hour Service
TO MOST FOUNDRY CENTERS

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Birmingham, Ala. — Foundry Service Co.	Minneapolis, Minn. — Smith-Sharpe Co.
Boston, Mass. — Klein-Farris Co., Inc.	Moline, Ill. — Midwest Foundry Supply Co.
Chattanooga, Tenn. — Frank Robbins, Jr.	New Orleans, La. — Barada & Page, Inc.
Chicago, Ill. — B. J. Steelman	Oklahoma City, Okla. — Barada & Page, Inc.
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Coldwater, Mich. — The Foundries Materials Co.	St. Louis, Mo. — Midwest Foundry Supply Co.
Detroit, Mich. — The Foundries Materials Co.	Oakland, Cal. — Industrial Supply Co.
Dallas, Texas — Barada & Page, Inc.	Seattle, Wash. — Carl F. Miller & Co.
Edwardsville, Ill. — Midwest Foundry Supply Co.	Toronto, Canada — Muir Foundry Supply Co.
Houston, Texas — Barada & Page, Inc.	Tulsa, Okla. — Barada & Page Supply Co.
Kansas City, Mo. — Barada & Page, Inc.	Vancouver, B. C. — Fleck Bros. Limited
Long Island City, N.Y. — F. E. Schundler & Co., Inc.	Wichita, Kans. — Barada & Page Supply Co.
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F. E. SCHUNDLER & CO., INC.
520 RAILROAD STREET • JOLIET, ILLINOIS

Schundler

Adventures of Bill

(*Concluded from page* 108)

contain a minimum amount of binding material.

"Castings of a somewhat similar character are molded either horizontally or vertically. Method adopted in any particular instance depends to a considerable extent on the amount of equipment already available. For example molds in which the patterns are mounted vertically would require a jolt machine, while molds with the patterns mounted horizontally could be made on a squeeze type machine. Similarly where a hoist is available, large flasks may be employed. Where no hoist is available, the flasks must be held within the lifting capacity of the molder or the molder and helper. Three methods are suggested. Each has certain advantages and disadvantages over the others:

1—Vertical molds, 4, 6, or 8 patterns to a flask. Dry sand cores without rods.

2—Horizontal molds with 2 or 4 patterns to a flask. Dry sand cores with rods.

3—Horizontal molds with 2 or 4 patterns to a flask. Green sand cores with special fluted arbors to strengthen the prints and hold the vent rods.

"Any molding machine maker will be glad to co-operate and give the benefit of his advice and experience in setting the job up on a production basis."

Several changes have been made in Amendment 1 to federal specification QQ-B-601 on Brass Castings (to be brazed). One change in raw materials is as follows: C-1. The raw materials used shall be such as to produce finished castings meeting the requirements of this specification. Other changes relate to packing and marketing, and to requirements applicable to individual departments.

PRODUCES STEEL FOR LIGHT CASTINGS

(*Continued from page* 82)

variation from these proportions causes a considerable lengthening of the melting time; thus, an increase to 30 per cent for the turnings increases the time of a heat by 15 minutes.

The time taken to charge the scrap is between 20 and 30 minutes, according to the size. The heavier scrap takes longer than the medium variety, which can be readily handled by shovels.

The aim is to melt from the bottom upwards, the arc being concentrated on the heavy scrap to form a pool of metal quickly. By this means a constant arc is maintained. Lime is added with the charge, about 75 pounds to the ton being used. This quantity is varied according to the condition of the scrap, dirty or rusty scrap receiving more and high quality material rather less.

Melting is conducted as rapidly as possible with a load of 5,000 amperes at 80 to 85 volts. The time taken to melt a charge of 45 to 47 hundred-weight (5040 to 5264 pounds) from the cold is usually 2 hours. During the melting period care is taken to prevent excessive heat in the center of the furnace by frequently pushing the charge towards the center. This prevents over-oxidation or direct attack by the arc on the furnace bottom. Further lime is added from time to time to form slag.

Produce Liquid Slag

When the bath is all clear-melted, the temperature should be just high enough to insure a liquid slag under normal conditions.

The temperature is increased as additions of broken ore are made to remove the oxidizable elements. Properly worked, a bath condition arises when a critical temperature is reached and a violent boil takes place. It is essential that this boil be secured. A short and vigorous boil is preferred to a long slow boil, carbon being reduced from approximately, 0.38 to 0.09 per cent in 10 minutes.

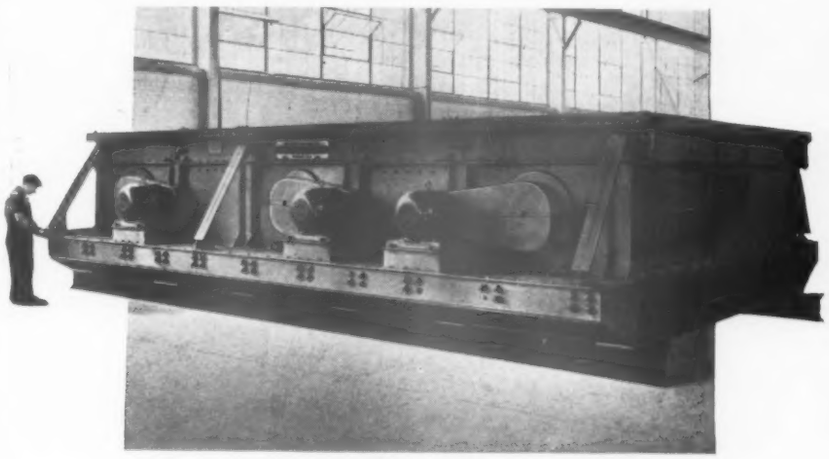
This short vigorous boil on a rising temperature gradient appears to be a crucial point in successful practice. Thus, if no boil takes place, the slag is glassy and reflects heat causing the roof to run and making the later formation of a true reducing slag very difficult. Also the absence of a boil appears to be associated with sluggishness in the finished steel.

A long slow boil at constant temperature leaves a bath which is very difficult to kill and which wastes a great deal of time during the finishing period. The essentials are to melt a bath with sufficient carbon (0.35 to 0.45 per cent) to cause a strong boil, to feed ore slowly and steadily while the temperature is raised and not to cause boiling at a low temperature by considering stirring or rabbling.

Immediately the boil has died down and a test shows a soft bath, a sample is sent to the laboratory for phosphorus estimation. The first slag is now poured off and a fresh lime slag put on. Fairly strong oxidizing conditions are maintained until the laboratory report is favorable.

At this stage, carbon, silicon, manganese and phosphorus are reduced to a minimum and are present in approximately the following qualities: Carbon 0.09; silicon 0.008; manganese 0.10 and phosphorus 0.015 per cent. There is no reduction of sulphur during the period of melting and oxidizing.

The slag at this stage is quite black and inclined to brittleness after cooling, containing CaO, 40 per cent; FeO, 24 per cent; SiO_2, 17 per cent; MnO, 4



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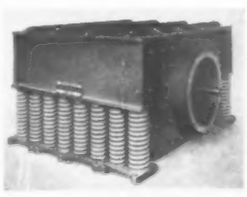

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per cent; P_2O_5, 0.9 per cent; and Al_2O_3, remainder.

The chemical changes which take place during the 2 hours period of melting and oxidation probably occur in three phases.

(1) *Elimination of silicon and manganese.* The silicon and manganese are oxidized by the presence of iron oxide added in the ore or included with the scale.

(2) *Elimination of phosphorus.* The elimination of phosphorus takes place secondary to the silicon and manganese. Three definite conditions are necessary for the efficient removal of phosphorus: (1) excess oxygen, (2) very basic slag, and (3) low temperature.

Table III

Pouring Times and Temperatures

Electric Furnace

	Shanking Heats,		Bottom Pouring Heats,	
	°F.	°C.	°F.	°C.
Tapping temperature	3002	1650	2876	1580
Temperature—First Pour	2912	1600	2840	1560
Temperature—Last Pour	2840	1560	2786	1530
Time pouring (min.)		25		20
No. of molds		80		67
Weight of metal cast (hundredweight)		47		45

(3) *Elimination of carbon.* Similar to silicon and manganese, the elimination of carbon depends upon the amount of iron oxide included in the charge or added in the ore. It is standard practice to take the carbon to the minimum in order subsequently to recarburize to the hardness desired.

After elimination of the carbon, silicon, manganese and phosphorus, the bath is ready for the removal of the oxidizing slag. The removal is supervised carefully as the slag is carrying phosphorus, and, under the reducing conditions which follow, this would revert to the metal.

The furnace is slightly tilted and the slag poured or lightly raked off, the load is then taken off and the electrodes raised. A little lime is added to thicken the slag, which greatly facilitates the slagging operation, and care is taken to remove all traces of slag from the sides and banks of the bath.

Skimming is conducted as rapidly as possible in order that heat should not be lost during this period.

When the bath is in good condition, the complete removal of slag is accomplished in 7 to 8 minutes. To the slag-free bath is added 10 pounds ferrosilicon per ton to quiet the metal which aids in producing a more uniform recovery when recarburizing takes place for higher carbon steel.

In the case of low carbon steels, no carbon is added at this stage, but for higher carbon steels 20 pounds of anthracite duff is thrown into the bath, followed immediately by one half the total ferromanganese addition.

The bath is now ready to take the refining slag which consists of 50 pounds lime, 20 pounds fluorspar and 7 pounds coal dust. The load is again introduced and refining begins.

The total refining time is approximately 1 hour, half of which is taken in forming the slag and the rest in deoxidizing and acquiring heat.

Low power input of 3,500 amperes at 85 volts is used at first, when the slag is quite black in color, and after

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Table IV

Pouring Times and Temperatures

Tropenas Converter

	Shanking Heats,		Bottom Pouring Heats,	
	°F.	°C.	°F.	°C.
Tapping temperature	3020	1660	2912	1600
Temperature—first pour	2966	1630	2840	1560
Temperature—last pour	2867	1575	2786	1530
Time pouring (min.)	25		20	
No. of molds	88		75	
Weight of metal cast (hundredweight)	32		30	

about 10 minutes as the slag begins to melt, a small amount of ferrosilicon is added which helps to hasten deoxidation.

During this period, the consistency of the slag carefully is observed, not being allowed to become too viscous or too thin.

When the slag is too thin, contact with the metal is not made and sulphur elimination does not proceed efficiently. If it becomes too thin, serious softening of the roof and walls takes place.

The slag is worked up to strongly reducing conditions by the addition of lime and coal as required, and at this stage is white in color, with a strong smell of acetylene denoting the presence of calcium carbide. At this point, the power imput is increased to 4,000 amperes. Spoon samples are taken for general conditions of the steel and the metal quited by small additions of ferrosilicon.

All samples during the refining period are taken with a cold spoon freed from metal and slag before use. The spoon is warmed carefully and slagged before dipping into the bath. Care is used to take the samples from the same position in the bath.

When the metal is hot enough and the slag in good condition, a sample is taken for carbon. Final adjustment is made with hematite and additions of 45 per cent ferrosilicon and 80 per cent ferromanganese are added to bring these elements to the desired quantity. The addition of ferrosilicon and ferromanganese are calculated from the known weight of metal in the bath.

The additions are allowed to melt and the bath well rabbled with a bar before a sample is poured into a sand mold. This sample should be quiet and piping. The load is taken off and the metal allowed to stand 2 or 3 minutes before tapping to enable the slag to separate.

The slag being highly basic and reducing conditions properly controlled, sulphur is efficiently reduced from 0.050 to 0.014 per cent.

Tapping takes place through a tap hole built up with sand outside the door. Although this is a somewhat lengthy procedure, it prevents the slag from running with the metal and avoids serious variation of carbon content and inclusions of non-metallic material.

The metal is tapped into bottom-pouring ladles which are preheated by gas burners to approximately 1472 degrees Fahr. (800 degrees Cent.) and aluminum is added as the bottom of the ladle becomes well covered.

The tapping temperature for shanking steel is in the neighborhood of 3002 degrees Fahr. (1650 degrees Cent.) and for direct-pour heats approximately 2876 degrees Fahr. (1585 degrees Cent.). Details of pouring times and temperatures are given in Table III. Unit consump-

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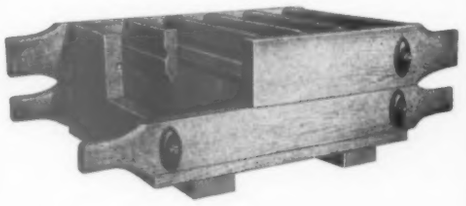

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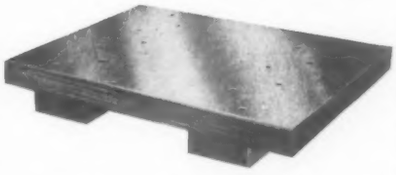

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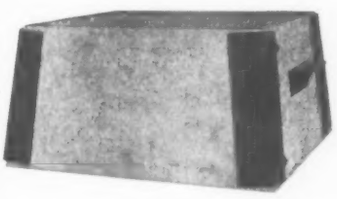

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tion is at the rate of 869 per ton, inclusive of coke-load and preheating.

The temperature readings are taken with an optical pyrometer, looking on to a clean stream of metal, and a correction of 7 per cent added.

The equipment in use in the converter shop consists of one 20 hundred-weight (2240 pounds) (nominal) tropenas converter with a positive blower to furnish air. One balanced-blast cupola, 27-inch diameter capable of melting 3 tons of iron per hour and one 2-ton capacity ladle for receiving the cupola iron for transfer to the converter; one lip pouring ladle from which steel is hand-shanked, and several bottom pouring ladles, all of which are preheated by gas burners.

Table V

Chemical and Physical Properties of Steel

Composition—per cent					Physical Properties				Heat
C	Si	Mn	S	P	Yield point lb. per sq. in.	Ultimate strength lb. per sq. in.	Elong. %	Reduction of area %	No.
Basic Electric Furnace									
0.20	0.25	0.85	0.020	0.015	46,592	73,360	39.0	40.0	C.10970
0.41	0.33	1.10	0.020	0.015	55,440	93,100	25.0	45.0	B.3448
Tropenas Converter									
0.18	0.22	0.85	0.032	0.037	38,430	71,680	36.0	56.0	F.9261
0.33	0.35	1.10	0.032	0.037	48,800	79,630	24.0	30.0	F.8342

The vessel is nominally of 1 ton capacity but the first charge is never less than 27 hundred-weight (3024 pounds) and this increases as the lining wears. The lining is 8-inches thick, except at the tuyeres side where it is 11-inches. There are five 1⅛-inch diameter tuyeres formed in the rammed lining for which a proprietary material is used. It is essential to control the moisture content at 8 per cent during ramming and to take steps to secure adequate drying and preheating before the first charge. The average life of a lining is 70 blows.

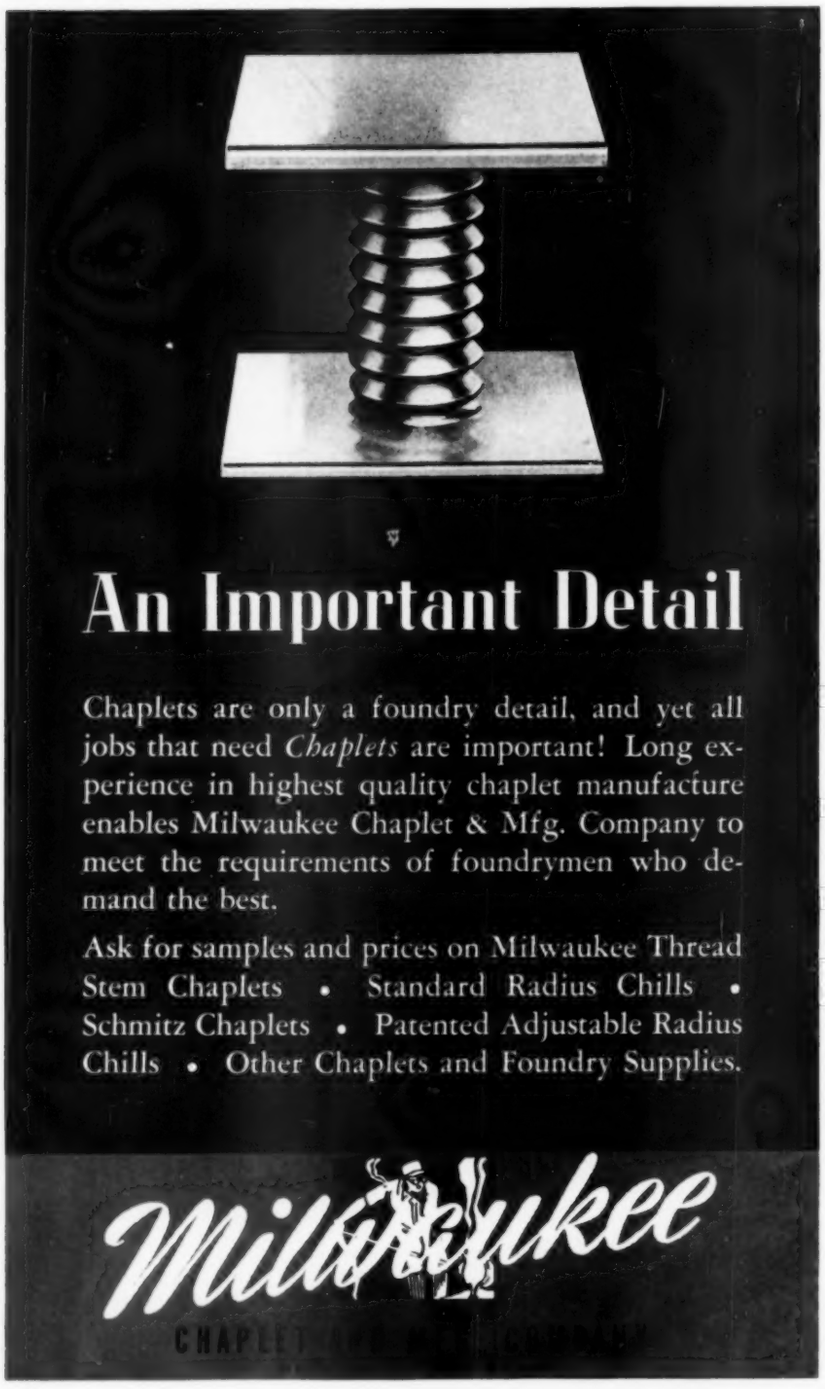
The timetable is based upon a standardized converter charge, uniform vessel temperature and controlled blowing conditions. The tuyeres must be perfectly perpendicular to the axis of the vessel, an error of a degree or so prolonging the blow 5 to 8 minutes and yielding cold steel.

The cupola is fettled (cleaned) and patched each morning, this operation taking roughly 2 hours. The sand bottom is rammed-up and a fire started, which is allowed to burn through steadily without forced draft, and in about 2 hours charging begins.

As small converters cannot be held to size easily, no patching of the vessel takes place and the capacity of the vessel increases during the week. Under these conditions, a standard cupola charge of constant weight cannot be maintained without seriously modifying the chemical composition of the iron charged to the vessel.

To avoid variation of chemical composition in the charge to the converter, the cupola charges are adjusted. Experience has shown that the converter weight increases along the following lines:

At the beginning of the week, 27 hundred-weight (3024 pounds) are required, and, as little wear takes place during the first two days, three cupola charges of 9 hundred-weight (1008 pounds) to the blow suffice. After the second day the weight increases by 1 hundred-weight to 28 hundred-weight (3136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pounds) and four cupola charges of 7 hundred-weight (784 pounds) are used. For the fourth day, the converter weight will have increased to 30 hundred-weight (3360 pounds) and three units of 10 hundred-weight (1120 pounds) are used.

The charges consist of 70 per cent steel foundry scrap and 30 per cent hematite pig iron, the silicon being adjusted by the use of 45 per cent ferrosilicon to give a final silicon of 1.40 to 1.50 per cent.

The coke used is of the Welsh variety, coke to metal ratio being 1:10. Chalk containing 55.0 per cent CaO and having a moisture content of 1.96 per cent is used instead of limestone, 25 per cent chalk to coke by weight being used. Melting losses, despite the sandy nature of the scrap and pig, are constant at 5 per cent.

Charging takes place immediately the bed has been made up, and as the cupola is hand-charged, the steel is charged first and the pig charged round the sides. Charging is completed in 40 minutes. The tuyeres of the cupola are set at a height that enables the cupola operator to secure enough metal for the converter in two taps. The taps run at regular intervals of 15 minutes with intervals of 5 or 6 minutes between each converter charge, during which time the tuyeres are cleaned and the slag-hole made up. Hot iron is secured from the cupola, the temperature being 2660 degrees Fahr. (1460 degrees Cent.) (optical pyrometer).

Add Soda Ash

Soda ash is used for desulphurization, one pound of sodium carbonate to one hundred-weight of metal being added to the receiving ladle before tapping. When the metal is tapped, a violent reaction occurs and heavy fumes are given off; after the second tap the reaction occurs again. Sulphur reductions given in a table in the original article but not included here indicate 48.8 to 56.7 per cent decrease of that in the cupola. When the metal has come to rest, the ladle is removed from the cupola pit and the metal skimmed ready to be poured into the converter.

After desulphurization, the weight of the metal is checked and poured into the converter which is in the charging position. The vessel is run up and the level adjusted by the operator. Blowing always takes place on the same angle. A quadrant is attached to the vessel clearly showing the angle, divisions of 5-10-15-20 degrees being shown by a pointer which revolves with the vessel. Blowing takes place on the 15 degree mark.

After the level is adjusted the blower is started and blast at 4 pounds per square inch pressure introduced. The operator records the time on a board and the blow is on.

A normal blow is as follows: As the blast strikes the bath, light yellow sparks and a small flame, going straight up the hood, proceed from the mouth of the converter. In about 5 minutes a reddish brown flame appears directly over the tuyeres. This spreads and develops in length and marks the beginning of the ignition period. At this stage any ferrosilicon that may be considered necessary is added to the converter in lumps. Three minutes after ignition, the flame attains its full height and a vigorous boil ejects a little slag and metal from the mouth of the vessel. At this point the blast pressure is gently reduced to 3 pounds per square inch and the vessel "moved up into the wind."

It is not considered good practice to reduce the blast pressure rapidly, as sudden reduction results in the loss of the flame. By the time the boil occurs, the bulk of the silicon and manganese have been oxidized together with a small amount of iron, passing into the slag as silica, manganese oxide and iron

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oxide respectively. After reducing the blast, the flame remains steady, being "solid" and having length, until about 12 minutes after ignition when the carbon flame ascends voluminously and intensely white in color. As the carbon becomes exhausted, the flame becomes streaked and diminishes in length. At this point the converter is turned down, the blow is completed.

The bath at the end of the blow is in a highly oxidized condition containing approximately carbon, 0.08 per cent; manganese, 0.005 per cent; and silicon, 0.008 per cent. No reduction of sulphur or phosphorus takes place, and actually a slight increase of these elements occurs, owing to the blowing loss which is roughly 8 per cent.

The practice of adding ferrosilicon to the converter is only used when metal is to be hand-shanked. It is found that additions of ferrosilicon have a pronounced effect upon the action of the flame, usually two or more boils taking place and, in the closing stages of the blow, it is not unusual for several false drops of the flame to take place before the carbon is finally exhausted. With such inconsistency of flame, the possibility of under or over blowing is considerable.

After the converter is turned down, deoxidation takes place by the addition of 45 per cent ferrosilicon and 80 per cent ferromanganese. The ferrosilicon at the rate of 12 pounds per ton or 25 per cent is added in tins, the slag being pushed away from the metal and the tins thrust into the bath. The ferromanganese addition is made by dipping the lumps in water and throwing them with force through the mouth of the converter, relying on the wet manganese to explode the covering of slag and penetrate into the metal. The loss of manganese is approximately 20 per cent, 1.20 per cent being added to finish at 1.0 per cent. The metal is then well rabbled with a bar to work in any manganese that may have been trapped by the slag.

The carbon is adjusted, when necessary, by the use of cupola metal. This method of recarburizing is easily adaptable, quick and efficient, hot handshanks of pre-determined capacity being used. The actual time taken to recarburize a heat is 3 minutes. After recarburization, the vessel is turned up to within a few degrees of the blowing position (to obtain the maximum movement of the metal) and back again to the pouring position, then rabbled well with a bar to insure homogeneity. The ladle is brought into the pit and the slag is held back to insure that the aluminum, which is added to the ladle, will be taken up by the metal, after which the slag is allowed to run freely.

The tapping temperature of converter metal compares favorably with electric furnace metal. Shanking-heats are tapped at 3020 degrees Fahr. (1660 degrees Cent.) and the bottom pouring heats at 2912 degrees Fahr. (1600 degrees Cent.)

Table IV gives details of pouring temperatures and times.

The authors wish to thank the directors of Lake & Elliot Ltd., for permission to publish this paper.

Appendices

1. Lining and Preheating of Electric Furnace

Lining: The side walls and arches of silica bricks are built into position. The bottom is then made up as follows:

Ground magnesite to the thickness of 1-inch is spread over the bottom next to the shell, over which is laid one course of 3-inch magnesite brick, a further 1-inch of ground magnesite spread over the bricks followed by 1-inch of fine, dry dolomite.

The actual melting hearth consists of dolomite bonded with tar, rammed into place with pneumatic rammers.

The tar is de-hydrated (0.5 per cent maximum H_2O) and 8 per cent by weight of tar to dolomite is used. The tar and dolomite are preheated before mixing but are rammed into the bath cold.

The roof is built with silica bricks.

Preheating: Coke is charged into the furnace and a load of 2000 to 2500 amperes at

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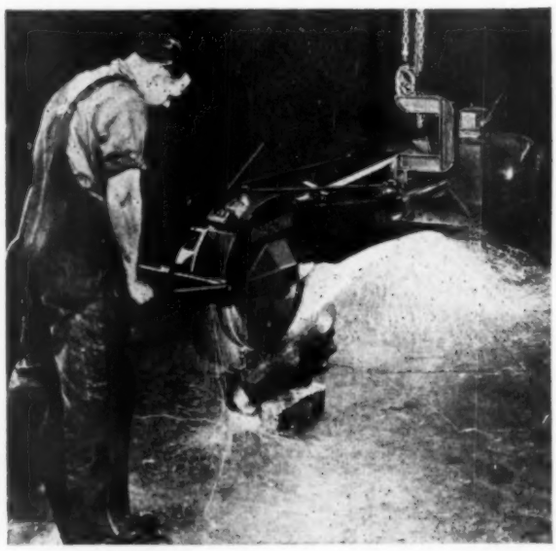

"Laboratory view" of a Marschke Swing Frame Grinder undergoing tests for study of spark action. Shields protect joints, belt and motor from the sand blast effect of sparks and grit to which vital parts of ordinary swing frames are subject. Notice how elimination of outboard bearings gives the operator a clear view of the work area.

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80 volts maintained. About 72 hours heating is necessary to bring the bottom or neutral current into operation in a new furnace.

Preliminary heating prior to the week's campaign is similar to the above with the heating time reduced to 6 hours.

2. Ramming, Drying and Preheating Converter Vessels

The bottom of the converter vessel is made up of three courses of 3-inch silica bricks. A well-known proprietary material is used for the walls, which are rammed round a wooden former, 27-inches across by 51-inches high, sectional in construction to facilitate removal.

The vitrified and burned material is chipped off the face, leaving about 1½ to 3-inch old material round the shell. This is slurried down and the new material rammed into place with pneumatic rammers. The vessel is allowed to stand, drying naturally for as long as possible before being put into work.

Drying and heating are conducted as follows: A small coke fire is started and allowed to burn slowly for 15 hours, additions of coke being made as required. After 15 hours, approximately 5 hundred-weight (560 pounds) of coke is added and air blown in through the tuyeres at 1½ pounds per square inch pressure. After blowing once up and down, a further 2 hundred-weight (224 pounds) of coke is added and the blowing repeated. Blowing up and down is maintained for 30 minutes in each operation; the vessel is then allowed to hang nose downwards with the tuyere box open.

The daily practice is similar. After the nose has been made up, a fire is started at 8:00 a. m. and alternate blowing up and down the hood takes place at 30 minute intervals. The vessel is then turned down until the coke is withdrawn. Coke consumption increases as the size of the vessel increases and reaches a maximum of 10 hundred-weight (1120 pounds.)

3. Physical Properties

Table V details the chemical composition and physical properties of the steels after normalizing from 1652 to 1688 degrees Fahr. (900 to 920 degrees Cent.)

4. Fluidity

The question of the relative fluidity of converter and basic electric steel often is discussed. It is usually held that converter steel is more fluid than basic electric steel.

In the experience of the authors, temperature is by far the strongest factor in fluidity. Temperature readings over a considerable period have shown that converter steel is consistently 104 to 140 degrees Fahr. (40 to 60 degrees Cent.) hotter than electric steel. It is their opinion that with well-made steels the difference in fluidity of the two types of steel at the same temperature is very small.

Non-fluid steels are encountered occasionally and, in the case of electric steel, this usually is found to occur in heats on which the boil has been unsatisfactory. This often is followed by a prolonged period under the final reducing slag. The steel is found frequently to be high in silicon and to contain considerable inclusions.

In no discussion on fluidity has any reference been found to non-fluid converter steel. Yet this occasionally occurs. It appears to be associated with cold iron in the converter charge and an extended period before the boil begins. A very fluid and sloppy slag high in FeO is formed and it appears that this results in a high proportion of non-metallic inclusions. It would be interesting to know if there is any definite evidence that lack of fluidity is associated with the presence of inclusions.

This article is taken from the official exchange paper of the Institute of British Foundrymen presented at the annual convention of the American Foundrymen's Association held April 20 to 24, 1942 at Cleveland. THE EDITORS.

Casting Alloys is the title of a 24-page booklet issued by the Niagara Falls Smelting & Refining Corp., Buffalo, N. Y., which lists the chemical compositions and physical properties of a large number of nonferrous alloys.

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Batch type machines are available as well as large continuous, conveyor and monorail-spray types to incorporate such sequences of operations as wash and rinse; or wash, rinse and dry, or special processes for surface treatment of metals, Machines will be suitable for solvent-emulsion degreasing or alkali cleaning. Drying will be accomplished with a recirculating air system. Machines will be steam, gas or electrically heated and can be supplied complete with controls.

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Sales office of the Electric Furnace Co., Salem, O., in Detroit recently has been moved to 5911 Courville road. B. C. Thompson is Detroit district representative.

HOW TO GET PURER HEATS—
GOLD BOND RAW DOLOMITE

EVERY experienced foundry man knows that the purer the flux, the purer the heat—that's exactly why Gold Bond Raw Dolomite has been gaining so rapidly in popularity as a foundry flux. And there's a reason!

Gold Bond Raw Dolomite comes from the North West Ohio Dolomite deposit famous for its purity. Analysis shows only a trace of sulphur—and absolutely no strontium sulphate—less than ¼ of 1% of silica dioxide. If you are interested in purer heats from your cupolas, write National Gypsum Company, Buffalo, N. Y. for full information.

Gold Bond
FOUNDRY PRODUCTS

ROCK WOOL INSULATION . . . RAW DOLOMITE . . . CASTING PLASTER . . . NON-SILICA PARTING BASE

NATIONAL GYPSUM COMPANY, BUFFALO, NEW YORK

A.F.A. PLANS ST. LOUIS WAR CONFERENCE

(*Concluded from page* 83)

ing Metals Co.; Chairman, Reception Committee, Lloyd Farquhar, American Steel Foundries; Chairman, Annual Dinner Committee (Cooperating with A.F.A. Dinner Committee) Luther Kleber, General Steel Castings Co.; Chairman, Ladies Committee, Mrs. C. B. Shanley; Chairman, Publicity Committee, John W. Kelin, Federated Metals Division, American Smelting & Refining Co. and Chairman, Golf Committee, Roy Jacobsen, Carondelet Foundry Co.

Particular attention is being given to hotel reservations at this time and it has been suggested that those planning to attend the meeting make such reservations as soon as possible. All reservations should be sent to E. Eugene Ballard, chairman housing committee, 919 Syndicate Trust building, St. Louis. Requests should state first, second and third choice of hotels as well as types of room and approximate price desired and, whenever possible date of time of arrival.

For convenience a list of some of the St. Louis hotels follows from which selection can be made. The housing committee will attempt to handle each reservation as promptly as possible. To facilitate housing plans under present war time conditions it is urged that reservations be made directly with the housing committee instead of with the hotel. Confirmation of all such bookings, of course, will be made by the hotel itself.

Hotels include American, Chase, Claridge, Coronada, De Soto, Fairgrounds, Forest Park, Jefferson, Lennox, Mark Twain, Maryland, Majestic, Mayfair, Melbourne, Park Plaza, Roosevelt, and Statler.

Castings on the move

Whisk them through the Foundry;
Zip them through the Cleaning Room.

Use the following to shorten long jobs and eliminate unnecessary ones.

LION BINDER - A strong, fast drying paste; tie wires not needed. A strong binder that bakes very fast.

EASY CLEANER CORE COMPOUND - Makes cores that clean out of the castings readily.

VULCAN BLACKING - Can be adapted to swift application; gives good surface, cleans speedily.

DUST-ON FACING - Shake it on green sand molds, close and pour. No tooling. Fast cleaning.

SUPERIOR PLUMBAGO - Rubs in immediately; doesn't "lift" the sand - - peels beautifully.

SILKOTE - Paint or spray on steel foundry cores, dry sand molds and skin dried work. Adaptable to fast application. Casting surfaces are really clean.

Manufactured only by

J. S. McCORMICK CO.
PITTSBURGH, PA.
FOUNDRY FACINGS • SUPPLIES • EQUIPMENT

Nominates Officers And Directors

Nominating committee of the American Foundrymen's Association met in Chicago Jan. 10, and placed in nomination officers and directors for 1943 to take office following the annual conference, which this year will be held at St. Louis, April 28, 29 and 30. Those nominated were: For president to serve for one year—Lee C. Wilson, general manager, Reading Steel Castings Division, American Chain & Cable Co., Reading, Pa.; for vice president to serve for one year, Ralph J. Teetor, president, Cadillac Malleable Iron Co., Cadillac, Mich.

Directors to serve for three years include: D. P. Forbes, president, Gunite Foundries Inc., Rockford, Ill.; Roy M. Jacobs, president, Standard Brass Works, Milwaukee; Max Kuniansky, general manager, Lynchburg Foundry Co., Lynchburg, Va.; Harry Reitinger, resident manager, U. S. Pipe & Foundry Co., Burlington, N. J., and W. B. Wallis, president, Pittsburgh Lectromelt Furnace Co., Pittsburgh.

All these men are well known as outstanding executives in the foundry and allied industries, and have been over the years active in the technical, educational and chapter work of the association.

Mr. Wilson, nominated to serve as president, has this past year served as vice president, and formerly served 3 years as director. He has also been active in the work of the Steel Founders' Society of America, this year being vice president of that organization.

Mr. Teetor in addition to serving for 3 years as a director, has been a member of the advisory committee, malleable division, and a director of the Western Michigan Chapter of the A.F.A.

Mr. Forbes, nominated as a director, is president of the A.F.A., prominent in the committee work of the association and of the Malleable Founders' Society.

Mr. Kuniansky is one of the foremost metallurgists and operating men, and a director of the Chesapeake Chapter of the A.F.A. At the 1941 convention of the association, Mr. Kuniansky was awarded the McFadden gold medal for his outstanding contributions to the industry.

Mr. Jacobs, well-known in the nonferrous foundry industry, has been especially active in the organization work of the Wisconsin Chapter, serving as president of that group in 1938-39.

Mr. Reitinger, well-known in the pipe casting industry, has served as director of the Philadelphia chapter, at the present time being chairman of the group.

Other directors of the association who will continue on the board after the 1943 conference are: J. G. Coffman, plant manager, Los Angeles Steel Casting Co., Los Angeles; M. J. Gregory, factory manager, foundry division, Caterpillar Tractor Co., Peoria, Ill.; Vaughan Reid, president and general manager, City Pattern Works, Detroit; L. N. Shannon, vice president, Stockham Pipe Fittings Co., Birmingham; J. E. Crown, master mechanic, U. S. Naval Gun Factory, Washington; H. S. Simpson, president, National Engineering Co., Chicago; I. R. Wagner, president, Electric Steel Castings Co., Speedway, Indianapolis; S. V. Wood, president and manager, Minneapolis, and W. L. Woody, assistant to president, National Malleable & Steel Castings Co., Sharon, Pa.

Directors whose terms will expire at the time of the 1943 conference in April are: George W. Cannon, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich.; B. D. Claffey, General Malleable Corp., Waukesha, Wis., Harold J. Roast, Canadian Bronze Ltd., Montreal, Que.; L. P. Robinson, Werner G. Smith Co., Cleveland, and H. S. Washburn, Plainville Casting Co., Plainville, Conn.

Spring Meeting To Be in Buffalo

The 1943 spring meeting and convention week of the American Society for Testing Materials will be held in Buffalo, March 1 to 5, at the Statler hotel. Two technical symposiums on powder metallurgy and paints for civilian defense are planned as features of the meeting. B. L. McCarthy, Wickwire Spencer Steel Co., is in charge of the symposium on powder metallurgy while W. H. Lutz, Pratt & Lambert Inc., is in charge of that on paints. The local committee on arrangements for the meeting includes: B. L. McCarthy, chairman; W. H. Lutz, vice chairman; T. L. Mayer, Buffalo Public Library, secretary; J. F. Barton, Federal Portland Cement Co. Inc.; T. J. Brown, Canisius College; A. W. Burwell, Alox Corp.; H. B. Chambers, Canadian Atlas Steels Ltd.; George Comstock, Titanium Alloy Mfg. Corp.; D. D. Crandall, National Gypsum Co.; H. J. Cutler, Bethlehem Steel Co. Inc.; J. R. Dawson, Union Carbide & Carbon Co.; G. S. Hallenbeck, Hallenbeck Inspection & Testing Laboratory; L. F. Hoyt, Allied Chemical & Dye Corp.; A. F. Knight, Cosmos Imperial Mills Ltd.; Fred Loosley, Dominion Foundries & Steel Ltd.; Alden Merrill, American Brass Co.; J. G. Morrow, The Steel Co. of Canada; O. M. O'Neill, Niagara Alkali Co.; F. A. Porter, Doehler Die Casting Co.; W. H. Rother, Buffalo Foundry & Machine Co.; Alexander Schwarcman, Spencer Kellog & Sons, and C. F. Smith Jr., U. S. Rubber Reclaiming Co.

National Cylinder Gas Co., Chicago, recently has placed its new Pacific Coast electrode plant in production. Sales offices of the firm for that area are located at 4950 Sante Fe avenue, Los Angeles, and 326 Howard street, San Francisco.

OVENS for Casting Conditioning too!
• The highly satisfactory performance of this aluminum heat treating furnace is due to the same factors responsible for the success of Lanly Core Ovens . . .
Efficient and economical generation of heat in the Lanly Air Heater . . .
Closely controlled temperature and Lanly balanced distribution and recirculation of the heated air . . .
Lanly exceptionally well insulated housing and door.
The layout provides for quick raising of the temperature to the desired point and immediate quenching of the castings upon completion of the heating cycle.
Lanly experience embraces the designing of core and mold ovens—furnaces for heat treatment of magnesium, aluminum and gray iron castings—and various kinds of industrial heat processing units for baking, drying and curing operations.
Lay your problems before Lanly for a recommendation.
Also
HEAT TREATING OVENS
• PAINT OVENS
• RUBBER CURING OVENS
AIR HEATERS ETC.
THE LANLY CO.
CORE OVENS
750 PROSPECT AVE.
CLEVELAND, O.

CYLINDER HEAD CORES MADE WITHOUT WIRES

(*Continued from page* 85)

to escape outward instead of into the metal and refractory enough to insure a clean skin on the casting. No particular difficulty was experienced in meeting most of the requirements. Foundries in different sections of the country found sands available for use. However, until McSherry and Whitehead developed a different technique recently, foundrymen in their effort to increase production, were stymied by the necessity of reinforcing the sand vanes with a great number of short wires. Even though the operators in many instances attained great speed and skill, considerable time is required to set from 500 to 700 wires accurately in restricted spaces.

In ordinary practice the vanes in the pattern are filled with sand almost to the top. The operator then inserts the wires. A true eye, steady hand and a high degree of skill are required to space the wires equidistantly and radially, and prevent them from actually coming in contact with the pattern at the bottom or on either side. Any wire touching the pattern, also will touch the resulting casting and produce a rough spot which must be removed by grinding.

In the method under consideration the mold for a cylinder head is not made in a flask in the ordinary manner. The pattern is split longitudinally through the center. The half pattern is mounted on a plate and placed on the molding machine where it is surrounded by a metal frame or corebox. A shovel full of sand is thrown into an electrically operated riddle supported on a movable arm about 2 feet above the pattern. While the operator moves the riddle back and forth a vibrator shakes the sand through the meshes and into the vanes. A temporary sheet metal frame keeps the facing sand close to the pattern. A vibrator on the pattern plate plus the force of gravity packs the sand to the required density. The operator places six wires in the vanes next to the joint and then the remainder of the box is filled with sand from a sandslinger provided with a pendent movable spout, struck off and rolled over in the machine. With the frames and pattern held in position, the block of core sand containing the impression of the pattern is lowered smoothly and gently and placed on a truck or rack for removal to the oven. Before going into the oven the vanes are sprayed with casein. Upon removal from the oven a few hours later the face is again sprayed with a proprietary compound supplied by the Dow Chemical Co., and also smoked with an acetylene torch. The treatment increases the strength of the sand vanes and produces a clean, smooth skin on the casting.

Cast in Vertical Position

While in a horizontal position, the main or combustion chamber core, also the valve port cores are set in the drag half core block. The cope half of the core block is placed on the drag and located in place by three bosses on the cope joint which fit into corresponding recesses on the drag joint. A layer of paste seals the joint and eliminates the necessity of daubing the outside joint with mud or any other material. The assembled block is turned through an angle of 90 degrees and set up in pouring position with the joint in a vertical instead of the former horizontal position.

A third flat core containing two combination runner and riser channels is clamped to the assembly and a fourth core is set on top to serve as a pouring basin. Metal enters the mold through two openings near the bottom, and through two additional openings near the center. The central openings are connected to blind risers. The upper flange of the casting is extended about 2 inches

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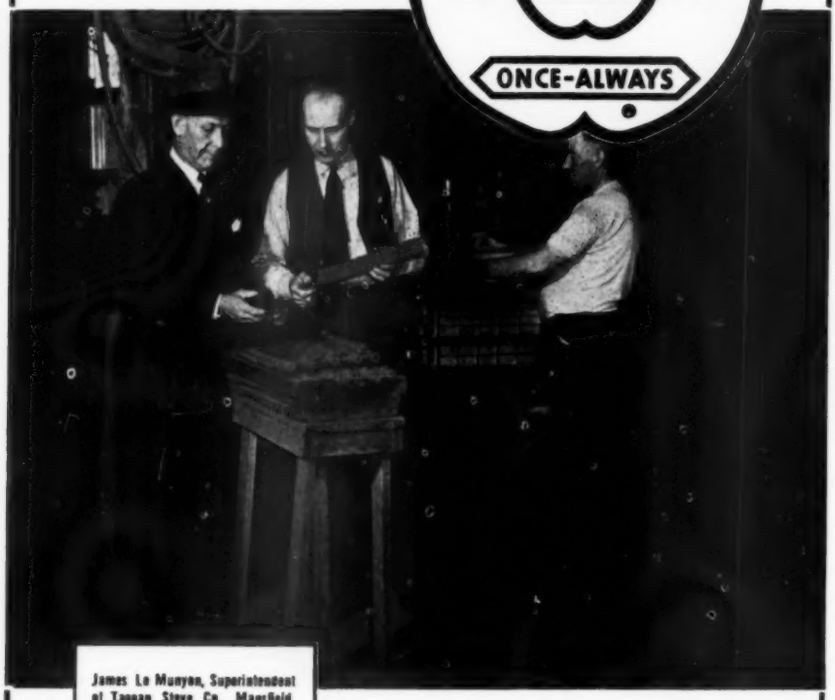


James Le Munyon, Superintendent of Tappan Stove Co., Mansfield, Ohio and O. C. McCormick, Special Representative for Cities Service Oil Company inspecting cores made in Tappan's Foundry, users of Cities Service Delco Core Oil No. 9.

● For years Cities Service Oil Company has marketed petroleum products of the highest quality—that quality must be upheld as the public acceptance of the products of Cities Service demands it. Cities Service Delco Foundry Products have been manufactured for over 20 years and have been used by many of the largest foundries in the country and with the greatest satisfaction.

Cities Service Oil Company has a complete line of core oils made with vegetable drying oils that are of the highest quality and uniformity and are designed to handle every requirement.

A Cities Service engineer can be of great value to your foundry in giving you information on our complete line of core oils for the many exacting uses.

Cities Service Delco Foundry Products,—core oils, core and mold washes, Steel Wash Concentrate and Rosinal, like all Cities Service products, are sold under no other name and only through channels authorized by Cities Service Oil Company.

CITIES SERVICE OIL COMPANY

OFFICES IN CHICAGO, CLEVELAND, DETROIT, ST. PAUL, CEDAR RAPIDS, KANSAS CITY, TULSA, FORT WORTH, SHREVEPORT, MILWAUKEE, TORONTO, NEW YORK

to serve as an extension or ring feeder. The extra metal is removed later during the machining operation.

A long series of experiments was required to determine the most suitable sand mixture prepared in 1000-pound batches in a muller type mixer. Choice finally settled on a mixture of 667 pounds fine grain silica sand and 333 pounds of another fine grain sand with a clay content of 0.8 per cent, 10½ pints core oil, 7 quarts cereal binder, and 9¾ quarts water to give a moisture content of 2.00 per cent. Baked at 450 degrees Fahr. for approximately 2 hours, sample briquets showed a tensile strength of 225 pounds per square inch. This sand is used to form the vanes.

The backing sand contains 333 pounds of the sand with the 0.8 per cent clay content, and 667 pounds sandblast sand, 9 pints core oil, 7 quarts cereal binder and 11½ quarts or 2.3 per cent water. Briquets from this mixture show a tensile strength of 170 pounds per square inch.

Following is a brief summary of the experimental procedure:

1—Sand thrown by hand into the fins. Remainder of box filled with sandslinger. Two 1-inch vibrators in vertical position used for 20 seconds. Pattern drawn. Without nails and with a few. Unsatisfactory.

2—Sand thrown into fins by hand, tucked with a thin stick, jolted a few times and remainder of sand thrown in by sand slinger. Vibrated from 10 to 25 seconds as in first instance. Fins broken.

3—Sand riddled into fins and tucked with thin stick. Remainder of procedure same as 2.

4—Sand riddled on fins and tucked. Weights were applied and jolt used a few times. Remainder of sand packed with sand slinger. Assembly shaken 10 to 25 seconds with horizontal 2-inch vibrator and pattern drawn. Jolt had tendency to break fins. Tried with no nails. Also with a few nails.

5—Sand riddled on fins inside frame which followed the contour of the pattern. Wood block placed in spark plug boss. Sand packed with a stick and tucked by hand. Sandslinger over remainder of space. Vibrated 10 to 25 seconds with 2-inch horizontal vibrator. Tried with no nails and with a few.

6—Sand riddled over fins inside frame and a wood block over spark plug boss with a 3-inch diameter vertical vibrator in action. Sandslinger placed about 2 inches of sand outside the frame. Frame removed and remainder of sand packed by sand slinger with a 3-inch vertical vibrator in action from 5 to 20 seconds. Tried with no nails and with a few nails. Fair results with this method.

7—Special sandslinger with variable speed control was used with 1, 2 and 4 tipped heads. Belt feed was set for double tipped head. Feed was too much for single head and too small for 4 tipped head. Sandslinger used with and without frame at speeds from 400 to 1200 revolutions per minute. Cores had soft spots either in the fins or the backing or both.

8—Sand fed inside the frame with a modified electric riddle and a layer of sand placed outside the frame with the sandslinger. Frame removed and sandslinger employed to fill the remainder of the box. Nails were placed in the 14 top central fins. This method gave the best results.

In a conveyor type oven the best baking results were secured in 3½ hours at 450 degrees Fahr. Metal was raised to a temperature of 1435 degrees in the melting pot to insure a temperature of 1410 degrees in the mold pouring basin.

R. Lavin & Sons Inc., 3426 South Kedzie avenue, Chicago, is constructing a plant addition to meet increasing demands for its products. Included in the expansion are new aluminum and brass furnaces which increase capacity about one-third, heat treating furnaces, improved laboratory and research facilities.

CORE-MOLD SPRAYER

10 CORES SPRAYED — WHILE ONE IS BEING BRUSHED!
. . . AND CORES ARE SMOOTHER

GREEN CORES ARE SPRAYED AS EASILY AS BAKED CORES

During application, the blacking material is being CONSTANTLY AGITATED

DEEPER PENETRATION, THEREFORE NO FLAKING OR WASHING

Send for descriptive literature

THE FREEMAN SUPPLY CO.

Pattern Shop and Foundry Supplies and Equipment
Mahogany and Pine Pattern Lumber

1152 EAST BROADWAY TOLEDO, OHIO

TRAINING OF FOUNDRY WORKERS

(*Continued from page* 86)

4. Three part flasks.
5. Cored jobs.

II. Core Making
- A. Core mixtures
- B. Baking of core
  1. Temperature
  2. Time

III. Melting and handling of metal
- A. Melting of brass and bronze
- B. Melting of aluminum
- C. Melting of cast iron
- D. Types of furnaces
  1. Electric furnace.
  2. Crucible furnace.

Since September, Chapter Chairman E. W. Horlebein constantly has urged managers and superintendents of foundries to encourage their supervisors, foremen and technicians to take advantage of courses being offered at the Johns Hopkins University Evening School. Many foundries in the Baltimore area have representatives taking one or more of the following defense courses: Chemistry of Iron and Steel; Metallography and Metallurgy; Alloy Steels (Advanced); Fundamentals of Ferrous Metals; Nonferrous Metals; X-Ray Interpretation; Industrial X-Ray Radiography; Spectrographic Analysis; Industrial Organization and Management; Time and Motion Study; Industrial Management for Junior Executives.

Every effort is being made to develop and offer courses of study that will have a direct influence on increasing foundry production in the Chesapeake Area.

Outline of Elementary Foundry Course

This course is to be offered to apprentices and learners who have been employed in the foundry for a period of one year and a half or less. Applicants working either in nonferrous or cast iron foundries will be eligible.

1. Foundry terms defined
2. Tools used in the foundry
   - a. Molders tools
   - b. Power tools
3. Foundry equipment
   - a. Flasks and rigging
   - b. Patterns
   - c. Melting equipment
   - d. Sand handling
   - e. Cleaning equipment
   - f. Molding machines
4. Foundry Sands
   - a. Molding sands
   - b. Core sands
5. Types of patterns and construction
   - a. Standard colors
6. Fundamental principle of molding
7. Molding machines
8. Gates and risers
9. Core making (Elementary)
   - a. Ramming
   - b. Reenforcing
   - c. Venting
   - d. Baking
10. Melting and handling metal (elementary)
11. Cleaning
12. Safety and good housekeeping

This course will be supplemented by speakers, movies and inspection trips.

Elementary Foundry Course

This course is to be offered to apprentices and learners who have been employed in the foundry for a period of 1½ years or less. Applicants working either in nonferrous or cast iron foundries will be eligible to take the course.

The instructor may modify this outline at any time to suit the needs of the students. Additional subject matter may be used if it is found to be desirable. Safety is to be emphasized at every opportunity.

1. Foundry terms
   - a. Historical
   - b. Localisms

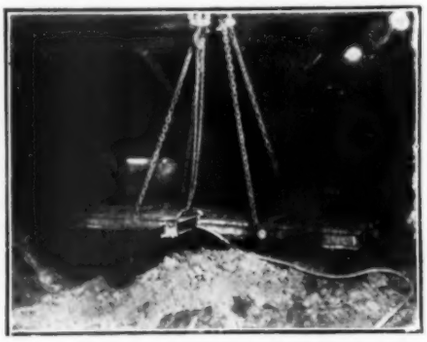
"BRANFORD"

VIBRATORS AND SPRAYERS

for speedy production of quality castings.

SAND HOPPER VIBRATORS
PATTERN DRAW AND RAPPING VIBRATORS
BLOW GUNS FOR CLEANING MOLDS
MOLD SPRAYERS
FLASK SHAKE OUT VIBRATORS
VIBRATORS FOR CLEANING OUT CORES

"Branford" products greatly reduce wear and damage to flasks and hoppers, with minimum use of air.



5" Flask Rapper shaking out copes 5' dia. to 10'6" x 20'0" x 12" deep.

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Write to Dept. 5 for Complete Catalog

NEW HAVEN VIBRATOR CO.

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Branford Plate Vibrators
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Sprayers, All Kinds
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1915 BRANFORD VIBRATORS U.S.A.

Hopper Vibrators
Container Loading Vibrators
Annealing Pot Vibrators
Vibrator Tables

c. Standard or correct usage
2. Tools used in the foundry
a. Molding tools
(1) Purpose
(2) Technique
(3) Care
b. Power tools
(1) Purpose
(2) Principles employed
(3) Skills
(4) Care
(5) Safety
3. Foundry equipment
a. Flasks and rigging therefor
(1) Snap, brass molders, steel, side floor, pit and special production
(2) Wood, iron, steel and aluminum
(3) Sizes and shapes
(4) Rigging that attaches to flasks; boards, gaggers, rails, weights, clamps, wedges, anchor keys and special equipment
b. Patterns
(1) Loose, gated, match plates
c. Molding equipment
(1) Crucible furnaces
(2) Cupola
(3) Electric furnace
d. Sand handling
(1) Hand operation
(2) Portable machine
(3) Conveyor
e. Cleaning equipment
(1) Hand tools
(2) Tumbling
(3) Blasting
(4) Grinding and chipping
(5) Inspecting
f. Molding machines (description)
(1) Squeezers
(2) Jolt squeezers
(3) Jolt, roll over and stripper
(4) Sand slingers
4. Foundry sands
a. Molding sands
(1) Composition—chemical and physical
(2) Selection
(3) Preparation and care
b. Core sands
(1) Composition
(2) Selection
(3) Bonding
5. Types of patterns and core boxes
a. A.F.A. standards
b. Shop symbols
c. Patterns as production devices
(1) Split, gated, match plates and other devices
6. Fundamental principles of molding
a. Historical
b. Organization
(1) Specialized as to metal
(2) For special production
c. Processes employed
d. Materials used
e. Foundry metals
7. Molding machines
a. Operation
8. Gates and risers
a. Nomenclature
b. Skimmers and strainers
c. Gating according to shape and size
d. Gating to suit the metal
e. Gates on patterns
f. Risers
(1) Size and location
(2) Feeding
(3) Use of chills
9. Core making (elementary)
a. Ramming
b. Reenforcing
c. Venting
d. Baking
e. Care of equipment
f. Blacking
10. Melting and handling metal (elementary)
a. Repairing furnace
b. Preparing furnace
c. Operating
d. Care of crucibles and ladles
e. Safety in handling and pouring
11. Cleaning
a. Improving surface
b. Grinding
c. Chipping
d. Sanitation
e. Care of equipment
12. Safety and good housekeeping

quick acting

NO 8 MEXICAN GRAPHITE

promotes increased machineability

• If certain phases of your foundry production seem to be lurking behind the "eight-ball", perhaps a small addition of No. 8 Mexican Graphite to your molten iron will change their pace . . . Grey iron castings that prove difficult to machine because of chill and hardness in the iron, usually revert to the foundry whence they came. . . . With the normal addition being less than two pounds per ton of iron, No. 8 Mexican Graphite (usually trickled into the stream of metal as it flows from the cupola spout) quickly produces a remarkable change in the physical characteristics of the iron. Hard iron becomes soft and chill reduction can be controlled to any desired depth. . . . No other ladle addition works so fast, so uniformly and so efficient as does No. 8 Mexican Graphite.

THE UNITED STATES GRAPHITE CO.
SAGINAW, MICHIGAN, U.S.A.

a. Attitude toward safety
b. Arranging materials
c. Use only safe tools and rigging
d. Safety devices
e. First aid
f. Care of tools, equipment and materials

Outline of Advanced Foundry Course

This course is to be offered to apprentices and learners whose foundry experience ranges from a year and a half to four years. Applicants working either in nonferrous or cast iron foundries will be eligible to take the course.

1. Branches of molding
   a. Green sand
   b. Dry sand
   c. Loam
   d. Cement
2. Sand conditioning and testing
   a. Molding sands
   b. Chemical analysis
   c. A.F.A. tests
3. Gates and risers
4. Core making
5. Refractories and fluxes
6. Foundry fuels
7. Casting defects
8. Foundry products
   a. Cast iron castings
   b. Steel castings
   c. Nonferrous castings
9. Melting equipment (Ferrous and nonferrous)
   a. Cupola
   b. Air furnace
   c. Electric furnace
   d. Crucible furnace
   e. Reverberatory furnace
   f. Open hearth
10. Mixing metals by chemical analysis
    a. Ferrous
    b. Nonferrous
11. Cleaning room problems
12. Inspection and testing of castings
13. Safety and good housekeeping

This course will be supplemented by speakers, movies and inspection trips.

Related Foundry Course of Study—Advanced

1. Branches of molding
   a. Green sand molding
   b. Dry sand molding
   c. Loam molding
   d. Cement
2. Sand conditioning and testing
   a. Molding sands
   (1) Source
   (2) Requirements
   b. Chemical analysis
   c. A.F.A. tests
   (1) Permeability
   (2) Strength
   (3) Moisture
   (4) Sintering
   (5) Dye absorption
   (6) Clay content
   (7) Durability
   (8) Mold hardness
3. Gates and risers
   a. Types for different metals
   b. Position
   c. Essentials of good gating
   d. Defects caused by improper gating
   e. Function of gate
   f. Function of riser
   g. Shapes of risers
4. Core making
   a. Core mixtures
   b. Controlling properties of cores
   c. Core binders
   d. Baking equipment
   e. Inspection and testing
5. Refractories and fluxes
   a. General properties
   b. Acid
   c. Basic
   d. Neutral
   e. Composition
   f. Testing
6. Foundry fuels
   a. Types
   (1) Coke
   (2) Oil
   (3) Gas
   (4) Electric
   b. Source
7. Casting defects

FOR VICTORY TODAY
AND SOUND BUSINESS TOMORROW

Get This Flag Flying Now!

This War Savings Flag which flies today over companies, large and small, all across the land means *business.* It means, first, that 10% of the company's gross pay roll is being invested in War Bonds by the workers voluntarily.

It also means that the employees of all these companies are making a definite contribution to Victory . . . by helping to buy guns, tanks, and planes that America and her allies *must* have to win. And it means that billions of dollars will be held in readiness for post-war readjustment.

Think what 10% of the national income, saved in War Bonds now, month after month can buy when the war ends!

For Victory today . . . and prosperity *tomorrow*, keep the War Bond Pay-Roll Savings Plan rolling in *your* firm. Get that flag flying now! For full details, plus samples of result-getting literature and promotional helps, write or wire: War Savings Staff, Section F, Treasury Department, 709 Twelfth Street NW., Washington, D. C.

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War Savings Bonds

This Space Is a Contribution to America's All-Out War Program by

THE FOUNDRY

a. Molding practices that may cause defects
(1) Hard ramming
(2) Soft ramming
(3) Excess moisture
(4) Not enough moisture
(5) Improper use of wet bulb
(6) Failure to vent cores to outside of mold
(7) Improper gates and risers
(8) Excess clay
(9) Improper sands and facings
b. Melting and handling procedures that may cause defects
(1) Improper melting
(2) Pouring temperature
(3) Clean metal

8. Foundry products
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(2) White iron
(3) Chilled iron
(4) Malleable
(5) High test
b. Steel
(1) Carbon
(2) Alloy
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(1) Brass
(2) Bronze
(3) Aluminum bronze
(4) Babbitt
(5) Silicon bronze
(6) Aluminum alloys
(7) Monel
(8) Magnesium
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(10) Fusible alloy

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(2) Operating cycle
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(4) Efficiency
(5) Air required
(6) Recent improvements
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c. Electrical furnace
d. Crucible furnace
e. Oil fired reverberatory furnace
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10. Mixing metals by chemical analysis
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(2) Outside scrap
(3) Virgin metal (nonferrous)
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b. Typical calculations
c. Losses
d. Meeting specifications

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(2) Grinders
(3) Sand blast
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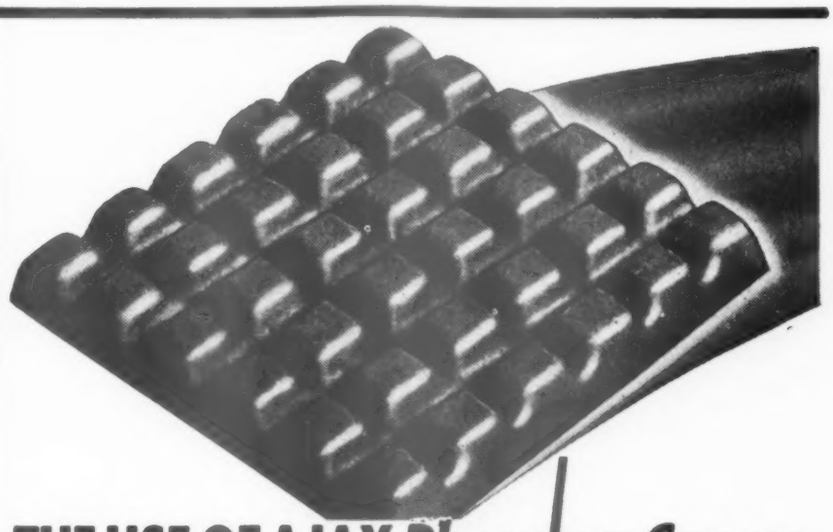
(2) Wear
(3) Impact
(4) Hardness
(5) Corrosion
c. Use of microscope
d. X-ray
e. Gamma-ray
f. Magnetic

13. Safety and good housekeeping

The author of this article, Donald F. Lane, is chairman of the Apprentice Training Committee of the Chesapeake Chapter of the A.F.A. The Editors.

Aluminum Bronze

Amendment 1 to federal specification QQ-B-671a for Aluminum Bronze Castings contain several changes including one on material which reads as follows: C-1. The raw materials used shall be such as to produce finished castings meeting the requirements of this specification. That supplants the former designation requiring best grades of ingot or best grades of ingot and scrap of known and approved composition. Other changes relate to packing and marking for shipment, and requirements applicable to individual departments.



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Ajax Silicon Copper
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NOTE

*"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

Successful foundrymen deoxidize or "clean up" molten metal by a scientific method worth using *as indicated:*

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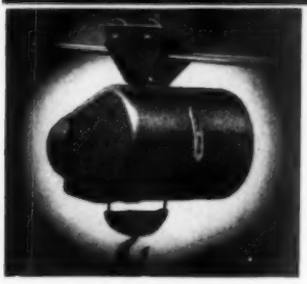

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HINTS ON CONVERTER PRACTICE

(*Continued from page* 87)

ture — Blown metal recarburized and ready for pouring must be at the proper temperature for the section thicknesses of the castings to be poured. From Table I it is seen that the pouring temperature is controlled largely by the amount of carbon, silicon, etc., burned out of the converter charge. It also may be controlled by the manner of burning out the carbon. Obviously the temperature of the converter lining and the metal when charged have a marked affect on the final temperatures.

Large converters, about 20 tons capacity, usually have excessive heat developed because of the high ratio of weight of metal to converter lining so that measures are taken to reduce the temperature of the charge and to keep the content of silicon down as low as economical. However, small converters, 1 and 2 tons capacity, have a relatively small ratio of weight of metal with respect to the lining. A greater proportion of heat is lost in these smaller converters and there are times, such as the first heat of the day, when it is a problem to tap adequately hot metal.

Potent Source of Heat

From the data in Table I it will be seen that silicon is the most potent source of heat. Each 0.1 per cent (2 pounds per ton) of silicon burned provides 25,200 B.t.u.'s which is about 2.5 per cent of the total heat developed. If the total heat when blowing a ton of a particular cast iron causes a temperature rise in the molten metal of 300 degrees Fahr., and we wish to raise the temperature 400 degrees then we must develop 33 per cent more heat. Each 0.1 per cent silicon increases the heat 2.5 per cent then to increase the heat a total of 33 per cent we must increase the silicon $33 \div 2.5 \times 0.1 = 1.3$ per cent or 26 pounds silicon per ton as a ferrosilicon addition to the cast iron.

Another way of calculating the amount of silicon in the charge is responsible for raising the metal temperature of this particular metal about 2.5 per cent of the total increase of temperature. This is 2.5 per cent of 300 which is 7.5 degrees Fahr. per 0.1 per cent silicon. If the desired temperature rise should be 400 degrees Fahr. or 100 degrees more than the 300 degrees we are now getting, then the extra silicon required is $100 \div 7.5 \times 0.1 = 1.3$ per cent silicon or 26 pounds silicon as ferrosilicon must be added to the cast iron charge.

Conversely if the temperature rise of the molten metal is too high, we may then wish to decrease the heat by lowering the silicon in the charge remembering that each drop of 0.1 per cent silicon causes a drop of 7.5 degrees Fahr. in the temperature of the molten metal.

Another method of increasing the temperature of the metal is to tilt the converter slightly when the carbon blow begins so that more free air enters the chamber over the bath. This free air will burn the CO gas coming from the metal and develop large quantities of heat which raises the temperature of the lining and of the metal.

The air required to burn out the impurities of one ton of the average cast iron having 3.25 per cent carbon, 1.75 per cent silicon and 0.50 per cent manganese will be about 10700 cubic feet at 70 degrees Fahr. and atmospheric pressure. The heat generated by burning out the carbon, silicon, manganese and about 2.5 per cent iron, which is average practice, is about 1,000,000 Btu's. The sources of this heat and the distribution of the heat during the blow are given in Table I when the silicon, manganese and carbon in the blown metal are each at 0.05 per cent.

Overcome Cold Metal

To overcome cold metal conditions it is seen that the operator may add ferrosilicon to the charge. However, this should be avoided, to conserve ferrosilicon and to keep down costs. He also has at his disposal the heat of item 7 in Table I utilized by tilting the converter so as to blow air directly into the chamber over the metal and burn the CO gas from item 3. This heat costs nothing but a little experience to familiarize the operator with the proper use of this method.

Burning out the Lining—In a normally operated SiO_2 (acid) lined converter of American practice, the slag is siliceous (predominantly acid) and, therefore, not too erosive on the lining at the slag line. However, at the air nozzles there is considerable FeO formed which is basic and which tends to slag off the SiO_2 around these openings. This portion of the converter lining must be repaired most frequently. Indeed in a bottom blow converter the bottom of the converter is removable so that a newly lined bottom may be put in place with the minimum loss of time.

Removal of Phosphorus—It is unnecessary to go into detail with the basic converter practice so common in Europe because the American steel industry has so much low phosphorus pig iron available. Briefly, however, the principle is to burn the phosphorus out of the metal after the carbon blow and after the addition of lime (CaO) to make the slag ex-

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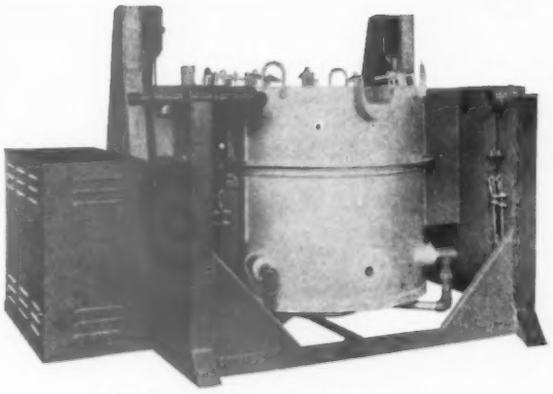

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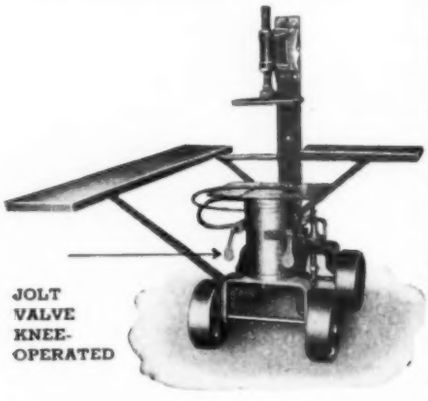

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cessively basic. Phosphorus is burned to P_2O_5 and immediately absorbed by the lime to make calcium phosphate. Without plenty of lime the P_2O_5 tends to go back into the iron as phosphorus about as fast as it is burned. Having a high lime slag, therefore, requires that the converter be basically lined to resist the slag erosion. The whole process involves more expensive linings and more difficult and longer operation. Because the blow is 25 to 30 per cent longer than in the acid converter the iron losses increase from 2.5 to about 6 per cent. For example, an overall 8 per cent loss of oxidation of impurities and 2.5 per cent of iron in the acid process compares with 13 per cent overall loss in the basic process including the removal of 1.5 per cent phosphorus and 6 per cent iron with the usual carbon, silicon and manganese.

Add In Handle

Recarburizing the Blown Metal—This should be and usually is done in the ladle with an attempt to have the blown metal pour into the molten spiegel and silvery pig. It is not good practice to recarburize in the converter because of the excessive losses of recarburizers to the highly oxidized slag.

In a small converter plant there may not be any facilities to melt spiegel and silvery pig. In such cases the use of 80 per cent ferromanganese and 50 or 75 per cent ferrosilicon dropped into the preheated ladle will work nicely. If the blown metal is not hot enough to take the cold ferroalloys put them into the ladle under the preheat burners which are operating on the reducing side.

In recarburizing, the iron oxides dissolved in the iron combine with some of the silicon and manganese of the recarburizer . Fortunately the silicon and manganese tend to unite with these oxides more readily than does the carbon. Thus there is little tendency for CO gas to form. This prevents a boil in the ladle and, of course, prevents porosity in the castings. The reason, therefore, that a heat of steel is specified to have 0.20 to 0.35 per cent silicon and 0.50 to 0.80 per cent manganese is to have more than enough silicon and manganese to remove oxides and completely kill the metal.

A bessemer heat is completed from cast iron to steel in about 15 minutes. There is little time or facility to correct mistakes in practice. It is important then that the process be operated properly with the following points in mind:

1. Always finish the blow on the high temperature side rather than the cold side. You can easily cool the heat but you can not raise its temperature after the blow. This is a necessary consideration for those heats of the day which tend

Castolin Eutectic

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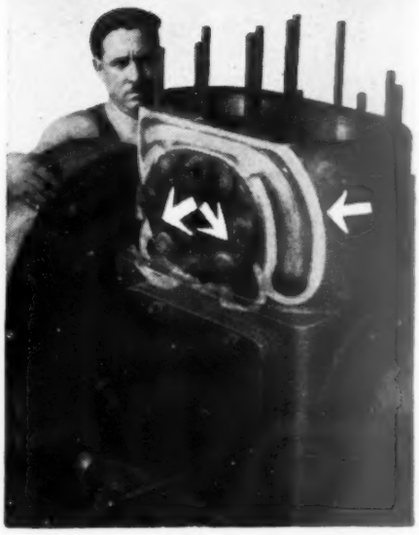

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to run cold.

2. Keep the analysis and the temperature of the molten cast iron charge as uniform as possible. This will result in more uniform temperatures, uniform time cycles and uniform analyses of the blown metal.

3. Use the electric eye to control the end point of the converter heat. This assures of more uniform composition of the blown metal which means the composition of the resulting steel will be more reliable.

4. Keep everything regarding weights of metal, condition of the lining, handling of metal to the pouring floor, etc., as uniform as possible. Uniformity of practice is all important in producing uniform reliable steel.

Book Review

Die Casting for Engineers, cloth, 148 pages, 6 x 9 inches, published by the New Jersey Zinc Co., New York, price $1.00.

To open this discussion, the book reviews the history and growth of die casting and then covers the principles and history of die casting machines with diagrams to illustrate basic principles of construction. Alloys for die casting are listed as the following: Zinc, aluminum, magnesium, copper, lead and tin. Each group of alloys is discussed separately and physical properties are outlined. This is followed by a discussion of the elements of die construction. This chapter is well illustrated with both drawings and reproductions of photographs. Compositions of metals suitable for dies are listed and important points to be considered in selecting the metal are emphasized. Remaining chapter titles, which indicate the scope of the material presented are: Die casting applications; inspection and tests; methods and tools for flash removal; machining practice; jigs and fixtures for machining die castings; finishes for die castings; and design of die castings. The book is completed with a cross index.

Safety Winners

Foundry winners in the 1941-42 safety contest held by the Metals Section of the National Safety Council, were as follows: Large plants, average frequency rate per group rate 18.78—1. James B. Clow & Sons, National Division, Birmingham, frequency rate 0.0; 2. American Radiator & Standard Sanitary Corp., Louisville, Ky., rate 1.38; 3. E. I. du Pont de Nemours & Co., Wilmington, Del., shops, rate 1.48. Small plants, average rate 27.65—1. James B. Clow & Sons, Newcomerstown, O., rate 0.0; 1. Louisville Car Wheel & Railway Supply Co., Louisville, Ky., rate 0.0; 1. Pullman-Standard Car Mfg. Co., Michigan City, Ind., rate 0.0.

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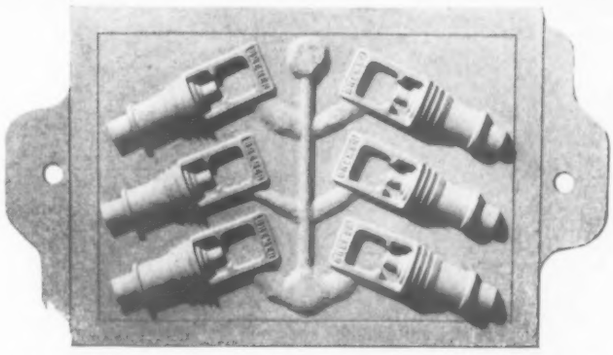

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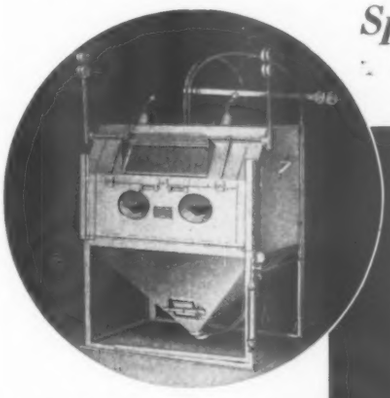

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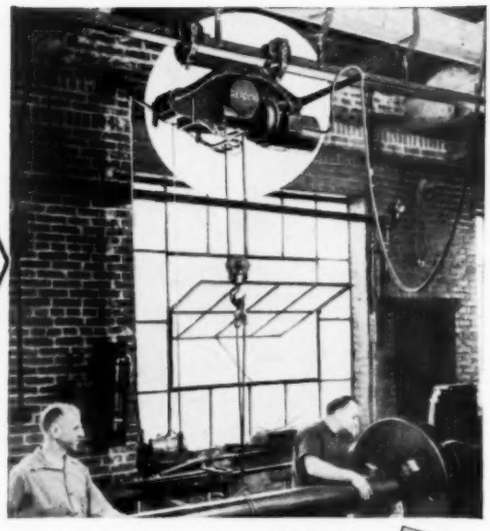

Here is a 1-ton Reading Electric Hoist that is boosting output *three ways* in a busy pipe manufacturing plant!

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in this 16-page booklet can help you get the most from every dollar you invest in hoists. Contains photos of parts and installations. A note on your company letterhead will start your copy of "Modern Materials Handling Magic" on its way to you.

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3— Lighting burner (from a cold start). Turn on motors on both oil pump and blower; place lighted torch immediately at the front of burner tip. Now open air blast gate to deliver about one-third of capacity; then admit oil gradually to the burner. Hold furnace at this low rate of firing until a hot spot has been established. Then turn blast gate valve to full open position and increase the oil input until the desired flame quality is attained.

4— Lighting Burner (when furnace is hot). Throw blast gate to wide open position; then turn on oil in sufficient quantity to produce desired flame quality.

5— Suggestions — It is not good practice to attempt to control oil-air ratios by use of air valve. The burners supplied with Fisher Furnaces are designed to deliver the proper oil input with the blast gate fully opened. Control flame quality with oil valve only. To avoid the use of air in excess of that required to maintain a neutral atmosphere, admit the oil in a quantity to produce a smoky tail on the flame, then reduce the delivery slightly until the smoky condition disappears.

To prevent coking within the burner body and to keep the burner clean, after each time the oil is shut off, sweep out the oil that collects within the burner by opening the blast gate for a few seconds. A sudden flash will be noted; after the flash, close the air gate.

If you do not have a copy of "Fisher Products for the Foundry" — Write for it!

5519 N. WOLCOTT AVE., CHICAGO, ILLINOIS

Fisher FURNACE COMPANY

DRIES MOLDS IN CONTINUOUS OVEN

(*Continued from page* 90)

cording to several formulas in a 6-foot muller. Molding sand is prepared in a similar device 8 feet in diameter. The general run of cores take a mixture containing 750 pounds sand reclaimed from the washer, 250 pounds silica sand, 6 quarts cereal binder and 9½ quarts of oil. Saddle cores exposed to more severe service are made from a mixture containing 1000 pounds new silica sand, 2 quarts of one cereal, 11 quarts of another cereal, 12 quarts silica flour, 11 quarts oil and 5 quarts iron oxide. Black cores for runner basins, covers and other similar purposes are made from a mixture containing 400 pounds reclaimed sand, 700 pounds old foundry sand, 25 quarts cereal binder, 45 quarts pitch.

Instead of preparing a supply of molding sand and facing sand separately, the entire sand supply is treated. Thus the sand intended for the skin dried molds is prepared in batches containing 2500 pounds as it comes from the shakeout, 7 quarts pitch, 2½ quarts bentonite, 7 quarts clay and 1 quart cereal binder. Sand for the molding unit where small castings are made in green sand molds is prepared in batches of 2000 pounds sand from the shakeout, 2 quarts sea coal, 3 quarts fire clay and 1 quart cereal binder.

Dust Is Removed

Castings are shaken out at two stations at opposite sides of the main bay near the center of the building, one station for the dried molds at the west side and the other at the east side for the green sand molds. Each station is provided with a hood and exhaust fan for removing dust. In each installation the sand falls through a floor grating into a chute which directs it on to a belt which discharges into the boot of a bucket elevator. The elevator in turn discharges the sand through a screen into a storage hopper located above the sand mullers. A lorry operating above the mullers receives a properly measured amount of sand for each batch. The various binders and other component parts of the batches are stored in bins in the vicinity. Names of each mixture and the correct amount of each ingredient are marked on a black board for guidance and constant reminder of the operators. The sand mixing equipment and materials are on a steel deck 8 feet above the core room floor.

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sandslinger is carried by belt to a storage hopper close to the wall and in line with the sandslinger. A revolving plate under the hopper removes the sand and discharges it on to a belt which in turn discharges a properly regulated amount to the revolving head of the machine for maximum efficiency.

The green sand molding unit in the east bay is equipped with a battery of molding machines set in a straight line under a row of sand hoppers. The hoppers are filled in the usual manner with sand from an overhead belt. Molds are placed on roller conveyors which extend from the machines to a point within reach of the cranes in the main bay. Metal is distributed over the side bay by a number of light traveling cranes. The poured molds are pushed from the short transverse conveyors on to a longitudinal roller conveyor which extends to the shakeout station.

Castings Are Washed

Castings large and small are loaded successively on a grated car which rolls into a sheet iron hydro-blast chamber. At a pressure of 1200 pounds per square inch, a stream of water and sand rapidly removes every vestige of sand from the outside and the inside of the castings. Spent water and sand sink through the steel mesh floor and then pass through an elaborate series of tanks and baffles which remove any definitely regulated amount of silt and discharges the reclaimed sand into a container where it remains until most of the moisture has been removed by drainage and evaporation. The process is hastened each night by burying newly shaken out counterweight and other chunky castings in the pile. Also by converting the wet sand into a pig bed for the reception of over iron from ladles and from the cupola at the end of the heat.

It is claimed substantial reductions in operating cost have been effected by the foregoing method of cleaning the castings. One man wielding the water and sand gun can clean more castings than a dozen men armed with the old fashioned bars and sledge hammers. The baneful dusty atmosphere associated for many years with foundry cleaning rooms has been eliminated. Core rods, bars, hooks and grids formerly broken or twisted in the removal process are recovered intact and in shape to be used again. Amount of sand carted or trucked to the dump is negligible. Consumption of new sand is approximately 10 per cent of the amount required where this material is used mainly as a rejuvenating agent.

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Materials for the cupola charge, coke, limestone, pig iron, cast iron and steel scrap are unloaded from railroad cars by an electric traveling crane and piled in orderly fashion in a long stock yard on the east side of the foundry building. The crane also lifts the required amount of these various materials each day and deposits them on an extension to the cupola charging platform where they are weighed accurately in accordance with the close control exercised in the production of castings that must conform to close and exacting physical and chemical specifications.

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W. C. Dillon & Co., 5410 West Harrison street, Chicago, has placed on the market a portable testing machine which is shown in the accompanying illustration. It is 32 inches high with a base 19 x 12 inches. Distance between platens is 18 inches, the maximum jaw opening is 13 inches, and width between posts is 9 inches in front and 1½ inches on side. The machine is claimed to make all type stress and some comparison tests up to 10,000 pounds per square inch. Indicator is dynamometer type with 5-inch

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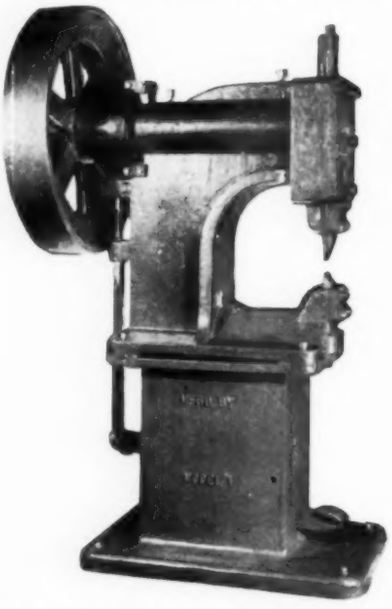

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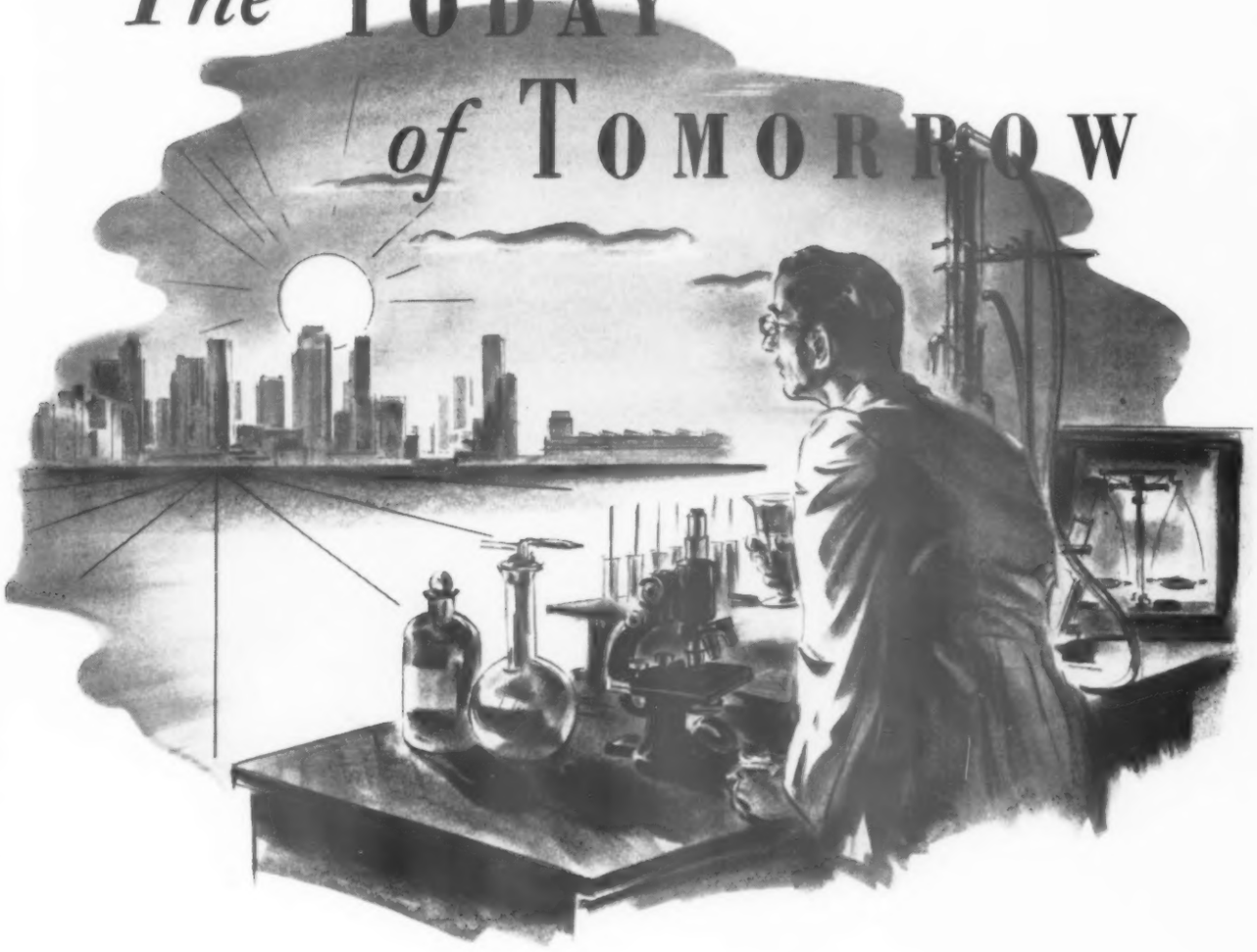

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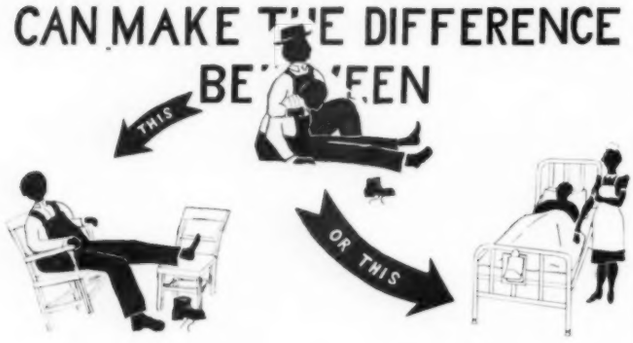

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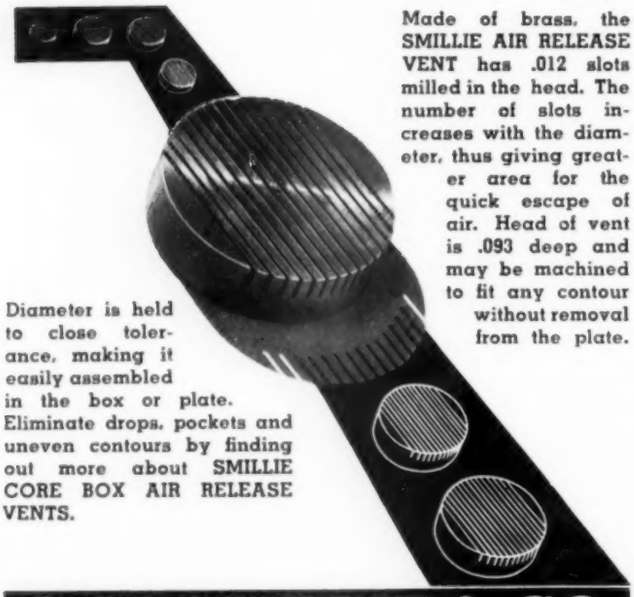

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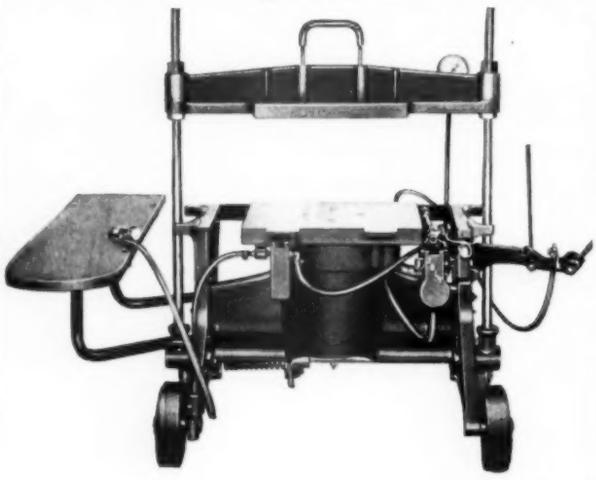

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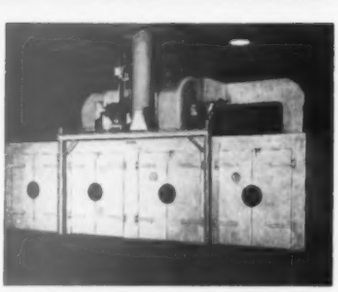

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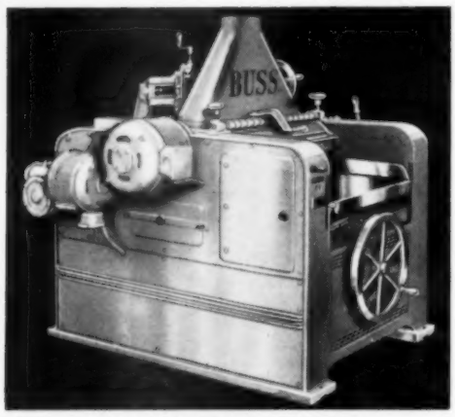

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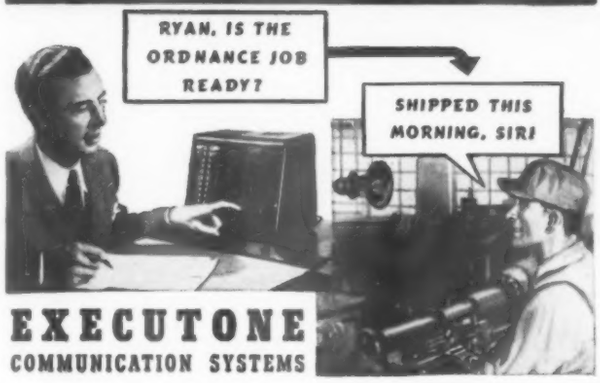

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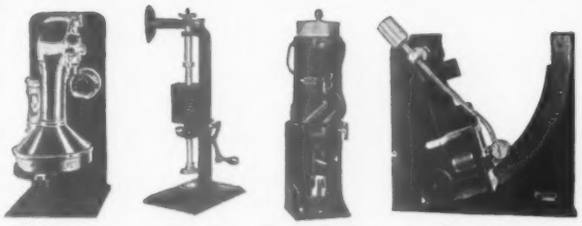

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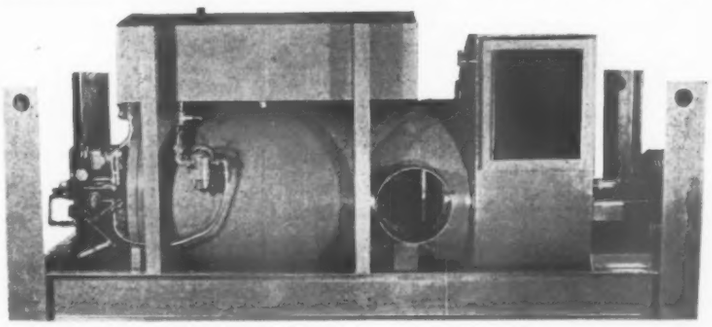

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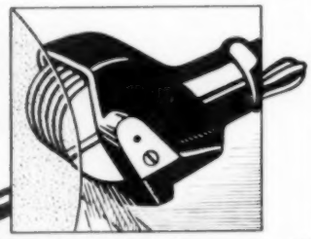

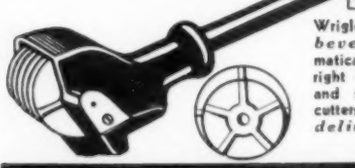

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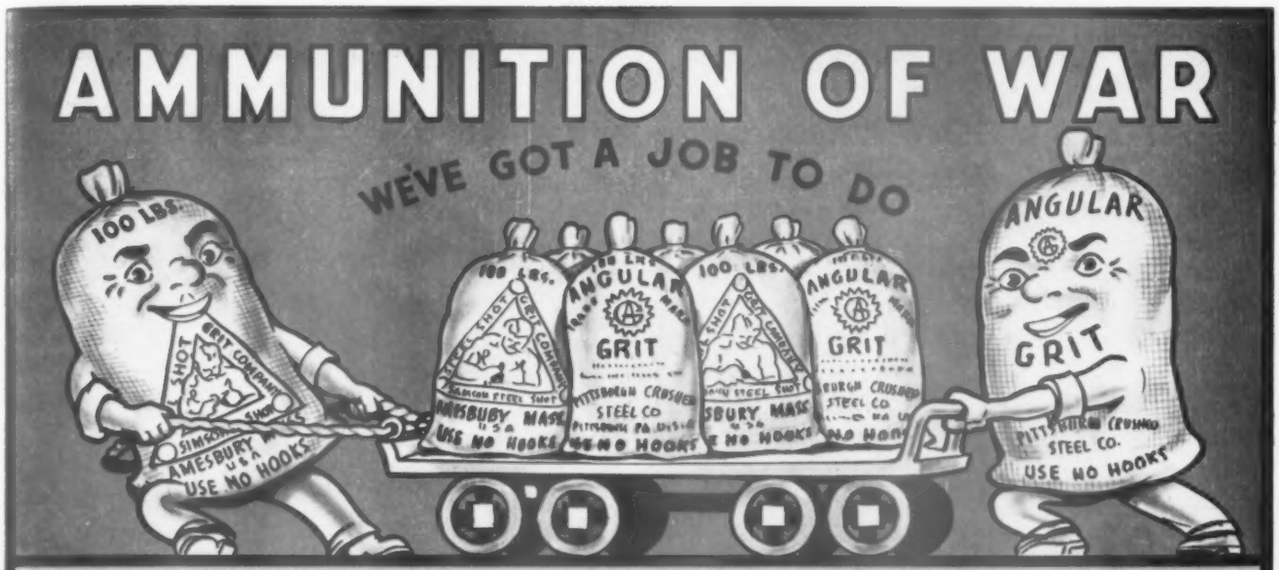

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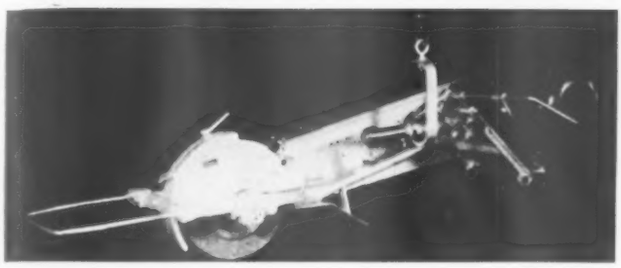

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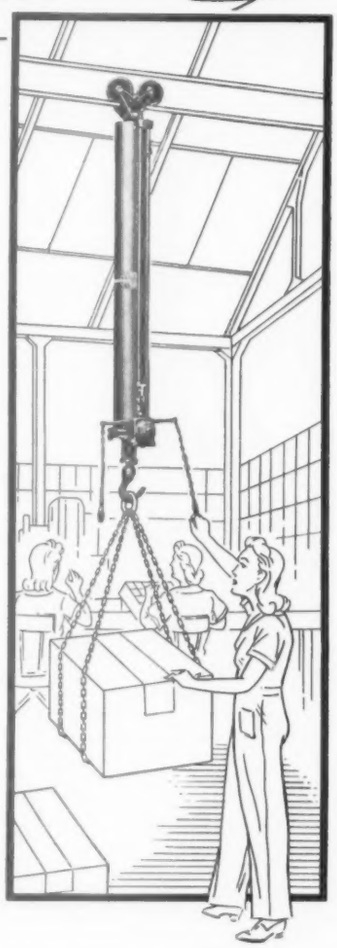

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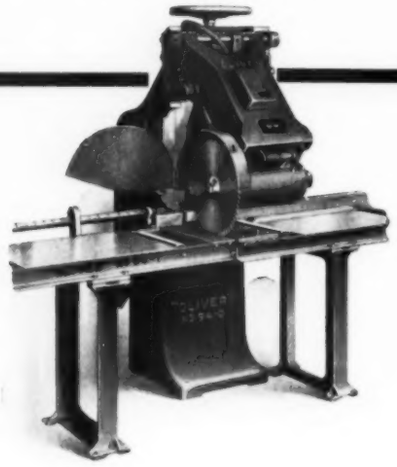

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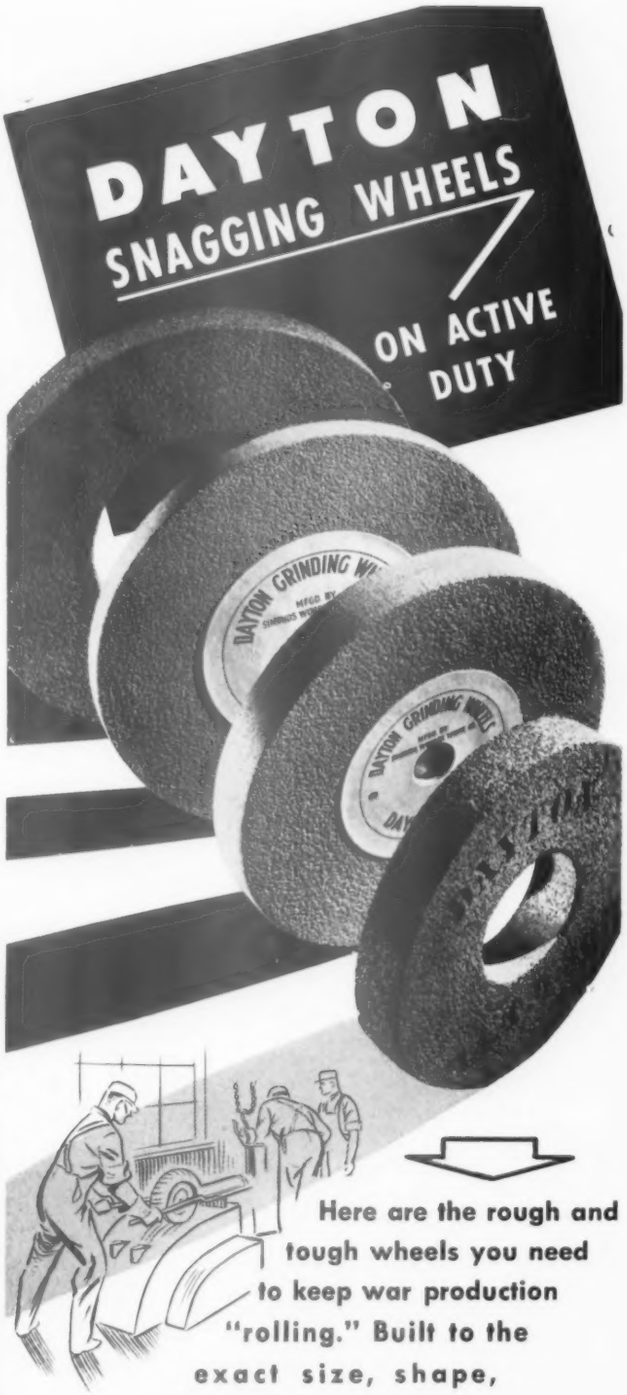

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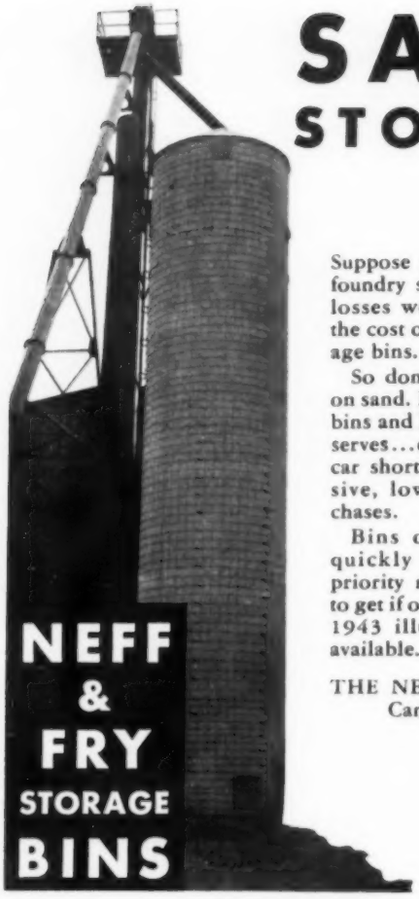

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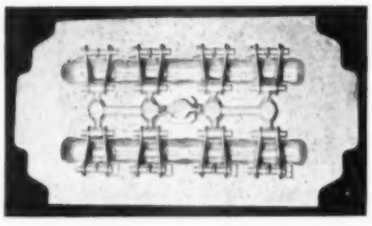

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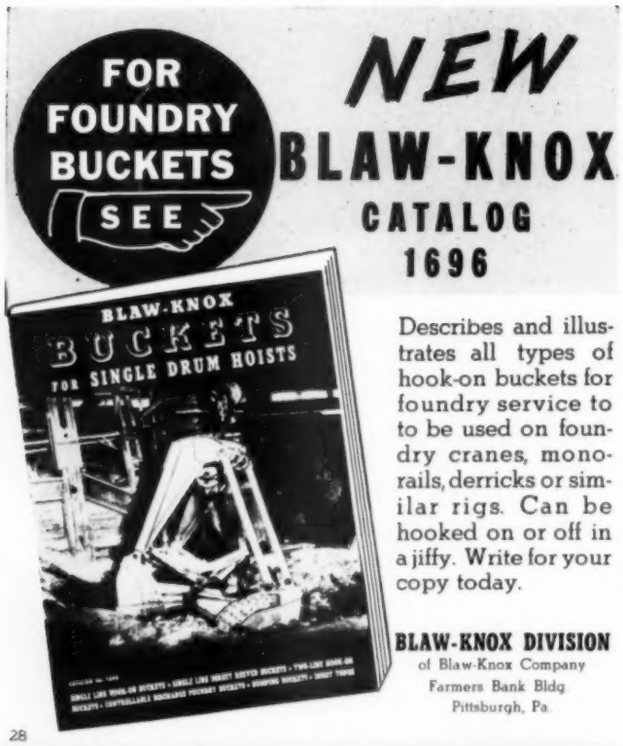

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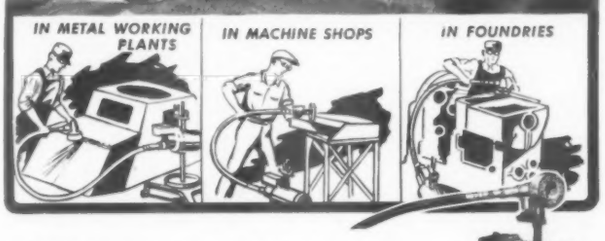

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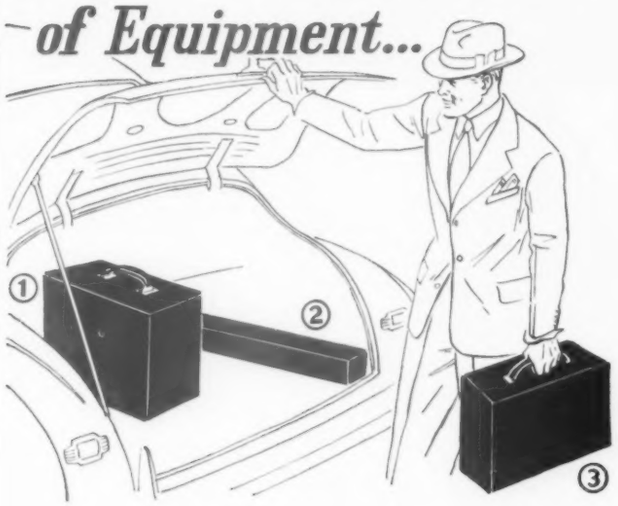

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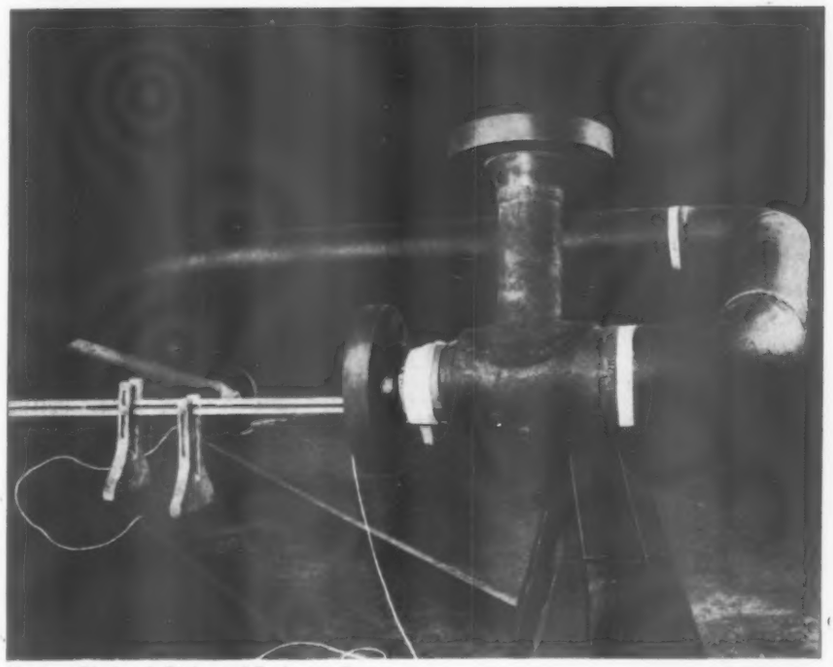

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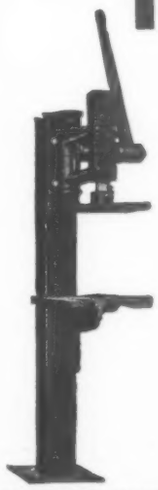

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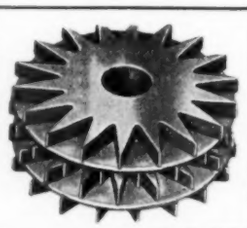

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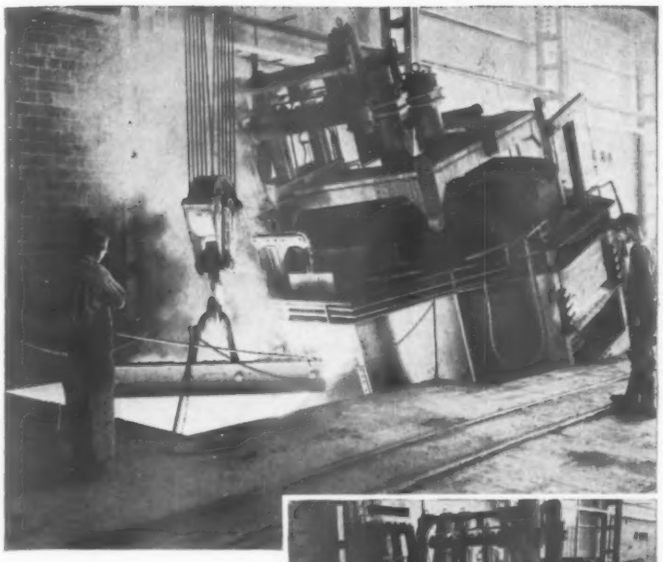

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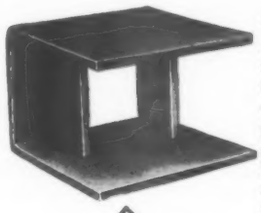

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Practical gray iron foundryman, age 44, technically trained, graduate metallurgist; with 23 years' broad experience producing quality castings in machine tool, general jobbing and high production. Well-versed in green and dry sand, cupola, rigging for machines, coremaking, and working from blue prints. Desires to make connection with reliable foundry in New England or East. Address Box 910, The FOUNDRY, Cleveland.

Classified Advertising

Positions Wanted

FOUNDRY MANAGER

If you are looking for an A-1 foundryman to operate your nonferrous foundry, consider this. Twenty years' practical and technical training in jobbing and production of quality castings from 2 oz. to 600 lbs. in weight. Twelve years' experience in all phases of foundry operation. Technical training consists of university metallurgy and foundry practice, personal efficiency, and personnel training; also short course in safety for the foundry. Age 42 and in good health. Interested only in job where he can take complete charge of all foundry activities, and must be with firmly established concern. Prefers work in South or moderate climate. Further information on request. Address Box 902, The FOUNDRY, Cleveland.

MALLEABLE IRON SUPERINTENDENT

Capable supervisor with background of 24 years' actual executive malleable experience. Is technically trained and has practical knowledge of departments involved. Basic training in foundry and pattern departments. Duration connection will not be considered. Correspondence in confidence. Address Box 898, The FOUNDRY, Cleveland.

FOUNDRY METALLURGIST

College education. Eighteen years' experience. All phases of foundry practice. Five years centrifugally casting iron. Now located on Pacific Coast. Desires sales and service work or position as Foundry Superintendent. Address Box 904, The FOUNDRY, Cleveland.

GRAY IRON FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Thirty years' foundry experience of which has been superintendent and general foreman for twenty years on jobbing machinery, castings, and practical foundryman in every detail. Best reference. Address Box 919, The FOUNDRY, Cleveland.

MECHANICAL ENGINEER

And successful executive with years of experience in all branches of a modern production ferrous foundry and machine shop desires change. Has had an unusual combination of education and practical experience. Not working at highest skill. Address Box 899, The FOUNDRY, Cleveland.

BRASS FOUNDRY SUPERINTENDENT

Wishes to make a change. Forty years' experience; 35 years as Foreman and Superintendent of shops in the East and Middle West on bronze and aluminum. Capable of entire supervision. Will go anywhere. Address Box 911, The FOUNDRY, Cleveland.

FOUNDRY SUPERINTENDENT OR GENERAL FOREMAN

Gray iron or semisteel—22 years' experience as executive on general jobbing and machinery medium and heavy. Practical foundryman in every detail. Address Box 912, The FOUNDRY, Cleveland.

GENERAL FOREMAN

Gray iron, cupola practice, can handle coreroom and oversee help to best advantage. Practical experience in all branches. Address Box 908, The FOUNDRY, Cleveland.

GRADUATE METALLURGICAL ENGINEER

Twenty years' experience in all phases of ferrous and nonferrous jobbing foundries. Is available after January 1943. Age 50. Address Box 900, The FOUNDRY, Cleveland.

EXPERIENCED FOUNDRY FOREMAN

Wants full charge of gray iron jobbing shop running about fifteen tons per day. Thoroughly experienced in molding and good producer. Address Box 916, The FOUNDRY, Cleveland.

FOREMAN

With 28 years' experience on any class casting; steel, gray iron and brass. Fifteen years as foreman. Will work as a molder. Go anywhere. Address Box 901, The FOUNDRY, Cleveland.

Positions Wanted

FOUNDRY MANAGER OR SUPERINTENDENT

Thorough knowledge of gray iron, semi-steel, and aluminum; mixing by analysis; and all alloys. Experienced in light, medium, and heavy work; pit-molding; sand slingers; rigging for squeezers; molding machines; and training men for maximum production. Reference. Address Box 909, The FOUNDRY, Cleveland.

Employment Service

GRAY IRON FOUNDRY EMPLOYMENT

We are receiving many inquiries for superintendents, metallurgists and foremen. We shall be glad to hear from qualified men. No charge.

Gray Iron Founders' Society Inc.
1010 Public Square Building Cleveland, Ohio

SALARIED POSITIONS

This advertising service of 33 years' recognized standing negotiates for high salaried supervisory, technical and executive positions. Procedure will be individualized to your personal requirements and will not conflict with Manpower Commission. Retaining fee protected by refund provision. Identity covered and present position protected. Send for details.

R. W. BIXBY INC.
101 Delward Bldg. Buffalo, N. Y.

Wanted-To-Buy

WANTED
The following used equipment

A 36" x 42" American Foundry Equipment Company Wheelabrator Tum Blast OR Pangborn No. 14 type "GK" Rotoblast, with or without loading device, but complete with ventilating and dust collector. Equipment must be in first class condition. Call or write **Kelly Foundry & Machine Co., Elkins, West Virginia, Phone 90.**

WANTED TO BUY

1300 to 1500 air compressor, or enough compressors to make 1500 ft. air. Also 150 KW 2300—250 V motor generator.

WANTED TANKS

12—10,000 gal. cap. or larger tanks to total 120,000 gal. cap.

RUSSELL STANHOPE,
Darien, Conn.

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address Box 578, The FOUNDRY, Cleveland.

USED METALLURGICAL MICROSCOPE WANTED

50 to 500X vertical illuminator, illuminating unit. Camera attachment also wanted. Bausch & Lomb or Zeiss preferred. Must be in good condition. Address Box 897, The FOUNDRY, Cleveland.

FOUR FOOT MIXER WANTED
SAND MIXER 4 CU. FT. CAPACITY
SIMPSON, CLEARFIELD OR EQUIVALENT

ALBANY CASTINGS CO. INC.,
VOORHEESVILLE, NEW YORK

Foundry Work Wanted

FOUNDRY CAPACITY AVAILABLE

Ferrous and non-ferrous. War orders being accepted for production beginning May 1, 1943. Good location within 100 miles of Chicago. Address Box 889, The FOUNDRY, Cleveland.

Foundries for Sale

FOR SALE

NONFERROUS FOUNDRY: YEARLY PRODUCTION AVERAGING $500,000; OLD AND WELL ESTABLISHED BUSINESS. DETROIT AREA. ADDRESS BOX 895, The FOUNDRY, CLEVELAND.

COMPLETE OPERATING FOUNDRY

And machine shop for Sale. Easy terms.
CHATFIELD MACHINE & FOUNDRY CO.
Escanaba, Michigan

FOUNDRY FOR SALE

In good trade area only foundry in 75 mile radius, 8500 sq. ft. floor space with plenty of yard room. Brick building. Also stock and equipment.

ENID FOUNDRY & MACHINE SHOP
Box 1544 Enid, Okla.

For Sale

SPECIAL SALE

1—Pridmore Roll Over.
1—International Roll Over, type "R" 14" x 8".
1—Coombs Riddle.
2—Sly 30" x 48" Tumblers Powered by Fairbanks Morse Motor Co. 3 phase, 60 cycle, 440 volts with Jones Gear Reduction & Starter Box.
1—Sly 24" x 60" Tumbler with Jones Gear Reduction Powered by Fairbanks Morse Motor Co. Motor No. 237031, Frame type, 5 HP, 1200 speed, 3 phase, 60 cycles, 440 volts.
2—No. 1 Demmler Air Operated Core Machine Manufactured by Wm. Demmler & Bros., Kewanee, Ill. Machine No. 1054.
1—Blystone mixer with Fairbanks Morse No. 138711, 440 volts, 60 cycles, 3 phase, 2 H.P. with switch attached.
2—42" double end grinder, 60 cycles, 440 volts, attached with switch 5 HP.
1—42" double end grinder, 60 cycles, 440 volts, attached with switch, 7½ HP.
1—Milwaukee Jolt Squeezers.
1—Wilbur-Green Blower for 84" cupola.
1—Newton Cupola, 40" shell, blower and 10 H. Motor.
2—Speed Reducers.
1—No. 4 Root Blower.
1—6 Ton Worm Geared Ladle.
1—Royer.
1—10 x 12 Chicago Pneumatic Air Compressor with 20 H. Motor.
1—12 x 12 Ingersoll-Rand Air Compressor with 50 H. Motor.
Chain Falls.
Air Chipping Hammers.
Core Ovens.
AC & DC Motors.
JW International Jolt Stripper.
I-75 Osborn Jolt Squeezers.
Tabor Jolt Strippers.
24" x 42" Tumbling Mills.
24" x 48" Tumbling Mills.
1—No. AA Sand Cutter Made by the American Foundry Equipment Co. No. 62 with 75' of cable.
1—50 H. Motor.
1—S. P. Clarage Exhaust Fan, No. 70.
2—Coombs Electric Riddles.
1—32" x 32" x 48" Tumbling Mills.
200'—Richard Wilcox Monorail, curved switches & trolleys.
8—500 lbs. track Ladle with Bail & Shank.

HAYNES FOUNDRY EQUIPMENT COMPANY
1735 Lake Street Phone: 7805
Kalamazoo, Michigan

Classified Advertising

For Sale

FOUNDRY EQUIPMENT FOR SALE

54-inch O. D. iron melting cupola.
Connersville-Root blower.
1—5-ton hot metal ladle.
1—2-ton hot metal ladle.
1 H. B. Smith jointer.

Equipment now dismantled—Ready for Immediate Shipment

R. R. PEEBLES
Box 772
Ashland, Ky.

TWO MOLDING MACHINES

NICHOLLS Jolt Strip Squeeze—husky and in excellent condition. Ready for immediate shipment. Address Box 870, The FOUNDRY, Cleveland.

FOR SALE—EXCEPTIONAL

Brass furnace, James Jones make, rotary-tilting. Direct flame with oil burner attachment, capacity 750 lbs. Good condition. Price $450.00 f.o.b. Los Angeles, California. Address Box 819, The FOUNDRY, Cleveland.

FOR SALE OR TRADE

48" x 76" Standard make tumbling barrel. Good condition; or will trade for good rotary sand-blast. Address Box 906, The FOUNDRY, Cleveland.

EQUIPMENT IN STOCK

GUARANTEED IMMEDIATE SHIPMENT

MISCELLANEOUS ITEMS

(1)—Young Bros. Gas Fired Core Oven, 12' 6" deep x 8' wide x 7' 6" high, double doors one end, 4" insulation complete with burner, flues and pyrometer.

(1)—1¾" cap. Shuster Power Sprue Cutter.

(4)—large flask vibrators.

(1)—10-HP. Black & Decker, double end 230-VDC Grinder, capacity 24" wheels.

AIR COMPRESSORS & BLOWERS

(1)—Ing.-Rand XCB, 2-stage, 9¼ x 12 x 15 x 12, 100-HP. motor, 220-/3/60-cycle.

(1)—12 x 12 Chicago N.S.B. 375-CFM. @ 100 lbs. with idler, unloader and lubricator.

(1)—12 x 10 Penna. 365-CFM. @ 100 lbs. belt drive, 60-HP. C.W. slip ring motor, 220/3/60-cy.

(1)—No. 4 Wil. Green Positive Pressure cap. 13-cu. ft. per rev.

ELECTRIC MONORAIL HOISTS

(30)—½ to 5-ton, 1 and 2 motor, Fl. and Cage operated, 230/440-volts, 3-Ph. 60-CY. 110 and 230-VDC.

OVERHEAD ELECTRIC TRAVELING CRANES

(1) to 50-tons cap. 18' 0" to 91' 0" span, 220/440-volts, A.C. and 230-VDC. We operate the largest crane rebuilding plant in the country. Send us your specifications for Cranes, Electric Monorail Hoists, Crane Motors, Standard Motors, Steel Buildings and Runways. We can quote you on equipment rebuilt to your specifications.

T. B. MacCABE CO.
4304 Clarissa St. Philadelphia, Pa.

For Sale

AIR COMPRESSORS

BELTED—176 ft., 355 ft., 540 ft., 676 ft., 752 ft. & 1300 ft.

ELECTRIC—355 ft., 528 ft., 676 ft., 807 ft., 1302 ft., 1723 ft., 2022 ft., 2200 ft., 2800 ft., 3600 ft., & 5000 ft.

STEAM—368 ft., 500 ft., 800 ft., 1221 ft., 1640 ft., 2200 ft., & 3000 ft.

DIESEL—368 ft., 603 ft., 900 ft. & 1300 ft.

GASOLINE—110, 160, 220, 310, 1300 ft.

R. C. STANHOPE, INC.
60 East 42nd St. New York, N. Y.

FOR SALE
PANGBORN SAND BLAST

Type 2 GH—5 cu. foot barrel capacity. Direct pressure blast application. Complete unit with blast machine and abrasive separator. Arranged for motor drive. This unit is in perfect condition. Price **cheap.**

GLOBE TRADING COMPANY
920 W. Lafayette Blvd.
Detroit, Mich. Cad. 6198

FOR SALE

One 2-cylinder—17½" Dia.—NORCROSS JARRING MACHINE—table size 50" x 144", Capacity 24,000 pounds. Subject to prior sale. The Transit Supply Company, Snell & Univ. Aves., St. Paul, Minn.

REBUILT USED EQUIPMENT

Molding machines, all types; tumbling mills; furnaces; cupolas; air compressors; hoists; rammers, all types; ladles, all types; sand mixers; sand blast tanks; core machines, etc. All equipment rebuilt and guaranteed. All sizes used steel flasks.

HAYNES FOUNDRY EQUIPMENT COMPANY
1734 Lake St. Kalamazoo, Mich.

FOR SALE

1 tilting crucible furnace No. 60, Denver fire clay, gas fired, no fan or motor. Never used.

Eastman Kodak Company
Kodak Park Works
Rochester, N. Y.

FOR SALE

One No. 6 Piqua positive pressure blower, 20" x 60"—35 ft. displ. top discharge, mounted on bed-plate direct connected to 40 h.p. Wagner 3/60/220 A. C. motor, with starter . . . used. Address Box 760, The FOUNDRY, Cleveland.

FOR SALE

One No. 7, 60" dia. 30' 0" high Whiting Cupola. One 46" dia. 30' 0" high. Both complete with blowers. Address Otto Biefeld Company, Watertown, Wisconsin.

NEW HAVEN ROTARY SAND BLAST FOR SALE

Size C636, Motor driven by 2 H. P. G. E. motor 3 phase, 60 cycle, 220 volt with 13 bags sand. Size 5 Roots Blower 16" opening arranged for motor drive.
Large stock fans, blowers, etc.

Harris Machinery Co. Minneapolis, Minn.

REBUILT
BLOWERS—FANS—EXHAUSTERS

Roots-Connersville positive cupola blowers. Centrifugal blowers for gas and oil burning. Sand blast, grinder end dust exhausters. Ventilating fans.

GENERAL BLOWER COMPANY
406 N. Peoria St. Chicago, Ill.

For Sale

FOR SALE

1 Royersford tumbling mill.
1 cupola, 44" shell.
3 ton hand crane, core oven, molding boxes.
2 Electric motors, 10 H. P.
1 Connersville blower, 1 Buffalo blower and fan. Band saw, etc. 3 scales—1 ten ton, one 2 and smaller one. The building is of concrete blocks 56' x 54'. 150 ft. frontage on St. Clair River. For sale or rent with back building for patterns and storage.

Riverside Foundry,
Port Huron, Michigan

WELDING EQUIPMENT

Welding, Cutting, Aircraft, Sheet-Metal, Soldering Outfits, Torches, Regulators and Gages, Acetylene Generators, Supplies, Electric Arc Welders. SUPERIOR OXY-ACETYLENE CO., HAMILTON, Dept. B, OHIO.

REBUILT COMPRESSORS AND BLOWERS

(3) Buffalo Forge Pressure Blowers, 1200 cfm @ 11 oz., 9½" inlet, 7 x 7 outlet, driven by 7½ H.P. A.C. Motors.

150 CFM, 3500 RPM Gen. Elec. with 6.2 H.P. A.C. motor drive.

SAND VIBRATOR

Jeffery-Traylor, shaker type CVS-8, 6" wide hand deck, capacity 7 to 8 tons sand per hour; with 15 cycle, 110 volt, single phase vibrator motor generator set. Write, wire or phone.

The Motor Repair & Mfg. Co.
1552 Hamilton Ave. Cleveland, Ohio

SPECIAL DEFENSE BARGAINS

Air Receivers up to 42" dia.

60" Cupola stack sections only.

Fans—Blowers—Exhausters for cooling, ventilation, dust or fumes removal, cupolas, etc.

Fan or **Centrifugal** style blowers—Maxon-Premix—from No. 0 to No. 4. Spencer Turbine, Am. Blower Co., Sturtevant, Buffalo, Clarage, Ilg etc. for Gas or Oil fuel Combustion.

Rotary Pressure Blowers — Roots-Connersville, Garden City, Green, Piqua, Sturtevant, Am. Gas Furnace Co. etc. Send specifications.

Furnaces for Brass and Aluminum Melting—Hausfeld Tilting Brass or Aluminum open flame, 400 lb. brass cap.; Booth Electric 725 lb. brass cap. with instruments. Stationary Furnaces, swing top for crucibles No. 60 to No. 150 and open top for iron pots up to 300 lb. aluminum.

Molding Machines—"Berkshire" 34" wide stationary air squeeze. "Tabor" 8" cyl. air squeeze. "Battenfeld" (Johnston & Jennings) stationary jolt squeeze; 5 in stock, Adams—Stationary hand squeezers 48" wide 2 in stock. Mumford—Stationary Air Squeeze 14 x 18" platen.

Crane Ladles—¾, 1, 2 tons cap. Rim Pour.
1—25 H.P. Diesel Engine, horizontal.
1—Beardsley & Piper Gyratory sand screen size 36" x 59"—1 H.P. Ball Bearing 3/60/220 A.C. Motor, Vee Belt Drive.

Sand Blast Barrel—Macleod 36 x 36" for belt drive.

Sand Blast Room—All steel 9'-10" x 20'-9" operators grilled table 3' x 10', down draft dust exhaust—8' ceiling. Air inlet thru ceiling.

Core Oven—Small portable 4 separate shelf compartments each 20" deep x 32" wide x 6" high for gas fuel.

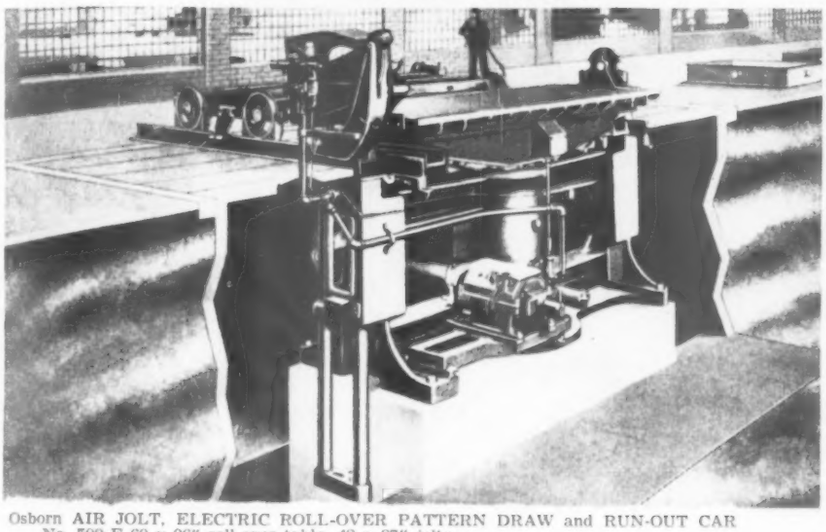
Tell us your needs.

CLIFTON MACHINERY CO.
1023 W. 6th, CINCINNATI, O.

SCULLY Reconditioned Foundry Equipment

★ ALL SCULLY EQUIPMENT IS REBUILT AND OVERHAULED IN OUR OWN, NEW MACHINE SHOP

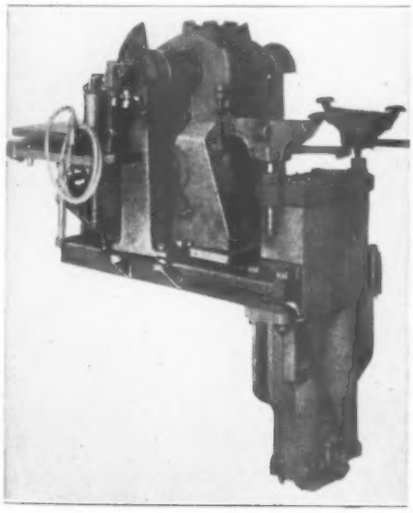
OSBORN MOLDING MACHINE



Osborn AIR JOLT, ELECTRIC ROLL-OVER PATTERN DRAW and RUN-OUT CAR
No. 509-E 60 x 96" roll-over table, 42 x 87" jolter.
No. 513-E 36 x 124" roll-over table, 36 x 112" jolter.

INTERNATIONAL MOLDING MACHINES

Type "F" 48 x 16" draw, comb. jar ramming, power turn-over power draw, 4000 lbs. cap. @ 80 lbs. press., 48 x 83" table.



INTERNATIONAL TYPE "F"
(Enclosed Model)

Type "F" 49 x 16" draw, comb. jar ramming, power turn-over and power draw, fitted with air equalizers, rollers in the draw section and hand operated core box clamps (rollers can be readily removed) jar plate 100" long, 6000 lbs. cap. @ 80 lbs. pressure.

MISCELLANEOUS

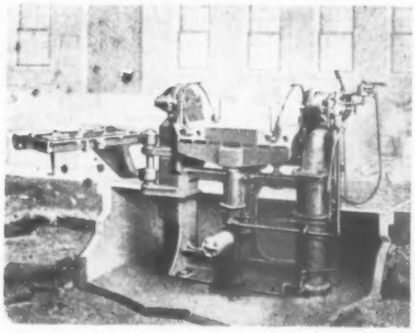
INTERNATIONAL Type "JL" jarring machine with power lift 10" dia. cyl., 39 x 54" table, 3500 lbs. lifting cap.

ARCADE No. 330 jolt roll-over squeeze pattern draw, equipped with new style locking device, portable.

HERMAN Independent Turn-Over and Pattern Drawing Device

60 x 84" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.
60 x 72" roll-over, 60 x 72" bumper, 10,000 lbs. cap. @ 80 lbs.
42 x 60" roll-over, 40 x 58" bumper, 6000 lbs. cap. @ 80 lbs.
40 x 60" roll-over, 48 x 58" bumper, 4000 lbs. cap. @ 80 lbs.
46 x 56" roll-over, 40 x 50" bumper, 3000 lbs. cap. @ 80 lbs.

OSBORN Jolt Roll-Over Pattern Draw Molding Machines



No. 403, flask cap 44 x 36" pattern draw 12"—1400 lbs. cap. @ 80 lbs. press. with swing-out Mold Table.
No. 405, flask cap 50 x 64"—pattern draw 18", 3000 lbs. cap. @ 80 lbs. press. with run-out Mold Car.

SQUEEZERS

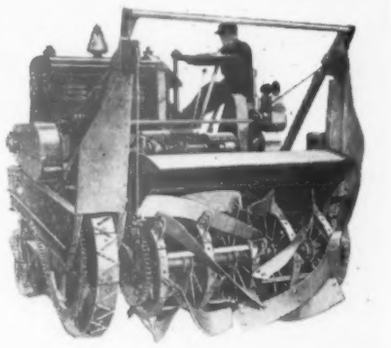
No. 75-J Osborn portable JOLT SQUEEZERS, 36" between rods, 10" dia. squeeze cyl., 15 x 19" table.
Tabor stationary PLAIN AIR SQUEEZERS, 36" between rods, 18 x 26" table.
Tabor Power Squeezing SPLIT PATTERN for 13 x 18" flask, 13" dia. cyl. 36" between rods. 4" draw.

60" SCHWARTZ Furnace, teapot type, oil fired, hand tilting

AMERICAN SANDCUTTERS

Model "AA" size 72, 60" cutting cyl. 72" between tractor wheels, complete with 7½ HP AC Motor, Cable and Reel.

Model "AA" 68" cutting cylinder, 88" between tractor wheels, equipped with 15 HP Crocker-Wheeler 220V AC Motor, Cable and Take-Up Reel.



Cleveland Model "B" Type 5-55, 55" spiral cutting cyl. 26" dia.—66" between tractor wheels, equipped with 3 Cleveland Elec 220V AC Motors, Cable and Take-Up Reel.

Model "K" size 84"—72" cutting cyl. 84" between tractor wheels, 6" face, equipped with 30 HP Westinghouse 3/60/220V AC Induction Motor, Cable and Take-Up Reel.

Model "K"—84" spiral cutting cyl. 36" dia.—92" between tractor wheels, 5" face, equipped with 3—220V AC Motors, Cable and Take-Up Reel.

NO. 2 DEMMLER
CORE BLOWING MACHINES

JOLT SQUEEZE & STRIP POWER

Milwaukee No. 113 Jolt Squeeze Strip, open end type, portable, 500 lbs. cap. @ 80 lbs. press. 6" draw, 16 x 35" table.

No. 142 Milwaukee, stationary, stripping cap. 1200 lbs. @ 80 lbs. press., draw 6" table 19 x 35"—open end type.

No. 703-6 Osborn jolt squeeze and strip, 21 x 28" table, stationary, length of opening in lifting frame 34", 6" pattern draw, 8" cyl. dia. 1000 lbs. jolt. cap. @ 80 lbs. pressure, distance from lifting frame to squeeze head 24¼", flask length 44½", with roll off conveyor.

No. 703-5 Osborn, same as above excepting 17 x 35" table.

OVERHEAD ELECTRIC TRAVELING CRANES

35-ton Morgan Power House Type 4-motors 550V DC with Aux Hoist, Chain on Main Hoist Cable on Aux, approx. 36 ft. span.

10-ton P&H approx. 27 ft. span, 3-motor type, 220V DC motors, cab oper. drum type cont. 25 ft. lift (double drum type Trolley).

5-ton Shepard approx. 18'5" span, 1-motor type 6 HP 220V DC, trolley and bridge hand racked, boxed girders.

5-ton 3-motors cage operated approx. span 33' 115V DC Motors, double web fish belly box girders, structural end trucks, 20' lift.

1½-2 tons DETROIT Type "H" LoHed Room, 3-motors, floor oper., approx. span 26'6" 3/60/220V AC 15" "I" Beams.

SCULLY MACHINERY & EQUIPMENT CORP.
(Formerly - Foundry Division of Scully-Jones & Co.)
2031 WEST 74th STREET (Phone PROspect 8770) CHICAGO, ILLINOIS

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FOR LACK OF DUST CONTROL *Production* WAS LOST!

The most effective and destructive production blockade found in any plant is dust and dirt. Lack of dust control means deterioration of plant machinery, equipment and a tremendous loss in production. Dust has been the cause of millions of dollars worth of time lost by employees due to illness.

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Write for free catalog "Mastery of The Air."

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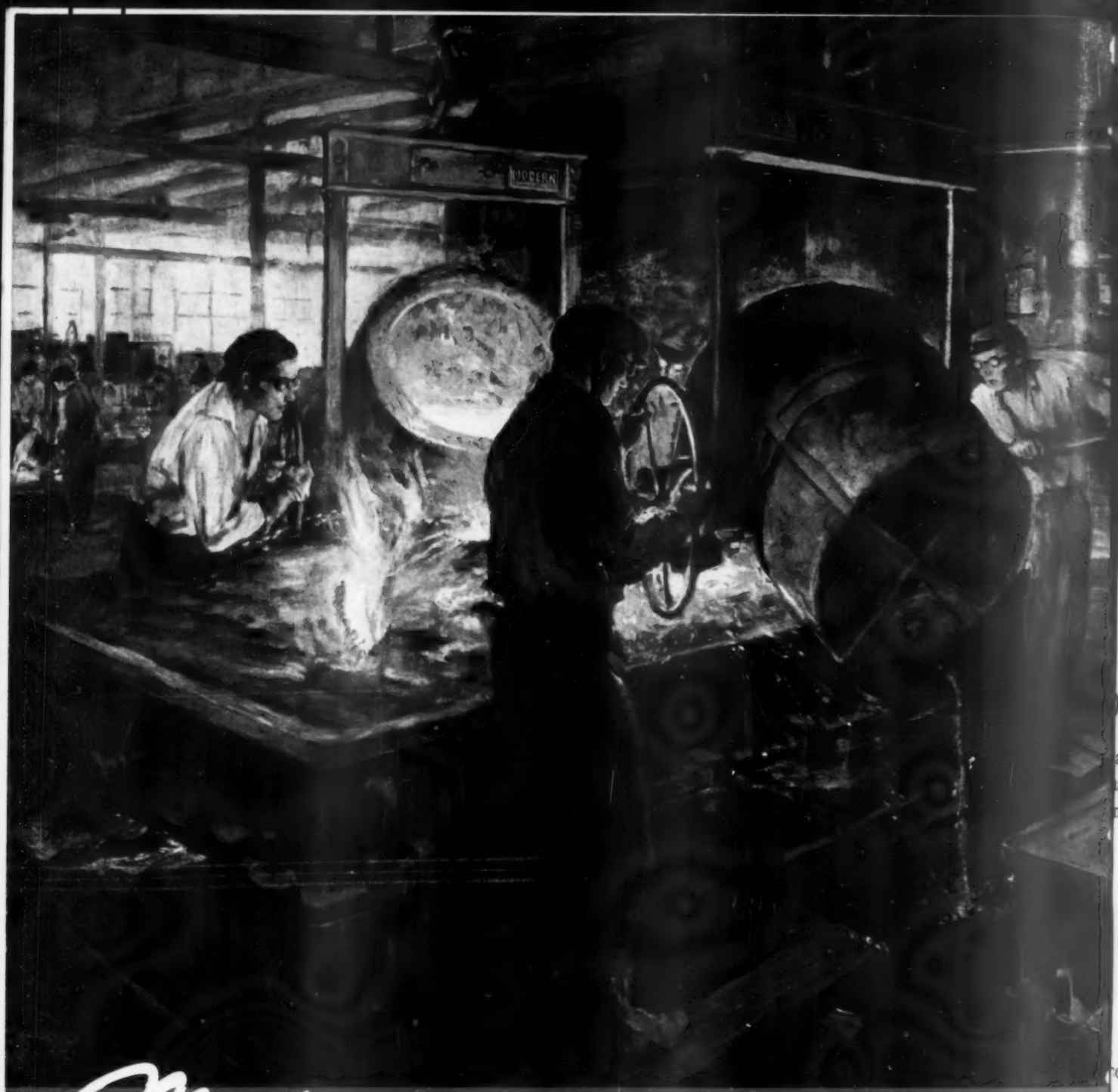

Modern POURING FOR MORE PRODUCTION

Modern ladles have done more than their share of pouring the Nation's metal under most trying conditions. Ladles of all kinds for all purposes our specialty.

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Cupolas — Cupola Chargers — Covered & Insulated Ladles — Lifetime Geared Ladles — Improved Bottom Pour Ladles — Metal Pouring Systems — Crane & Monorail Systems For Metal & Mold Handling — Furnace Charging Cranes — Electric Mold Skin Driers

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DEPT. 192

LADLE BOWLS by Stevens

NO SEAMS
NO WELDS
NO RIVETS

Prompt Shipment no waiting for these Stevens Stamped Ladle Bowls — because standardization allows quantity production for stock. Stock sizes listed below can be shipped promptly.

- Pressed from a single sheet of *special analysis*, extra heavy steel.
- No weak joints which may give way quickly.
- Uniform in size and shape.
- Cost no more than ordinary welded or riveted ladle bowls.

Large Ladles and Geared Ladles built to order.

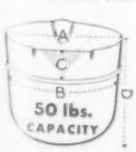
Use Stevens Stamped Steel Ladle Bowls. Thousands of repeat orders are mute testimony that they give complete satisfaction.

SPECIFICATIONS—PRICES

250 Lbs. Capacity	200 Lbs. Capacity	150 Lbs. Capacity	100 Lbs. Capacity	60 Lbs. Capacity
Made of 5/32" Steel	Made of 1/8" Steel	Made of 1/8" Steel	Made of 1/8" Steel	Made of No. 14 Gauge Steel
$4.25	$3.00	$2.50	$2.25	$1.35

f. o. b. Detroit or Nearest Branch

STYLE No. 108



STYLE S

Round Bottom Bowls

Quantity production makes possible very attractive prices.

Style No. 108	Style S
A—8¼ INCHES	A—8¾ INCHES
B—8¼ INCHES	B—8¾ INCHES
C—1⅜ INCHES	C—1⅝ INCHES
D—6 INCHES	D—7 INCHES

LADLE LINERS

Made of highest grade fire clay. Suitable for any metal. Made only to fit all sizes of Stevens Stamped Steel Ladle Bowls.

GEARED LADLES

See Stevens Catalog No. 25 for complete details on pouring equipment of all types—including Buggy Ladles, Trolley Ladles, Reservoir Ladles, Elongated Mixing Ladles.

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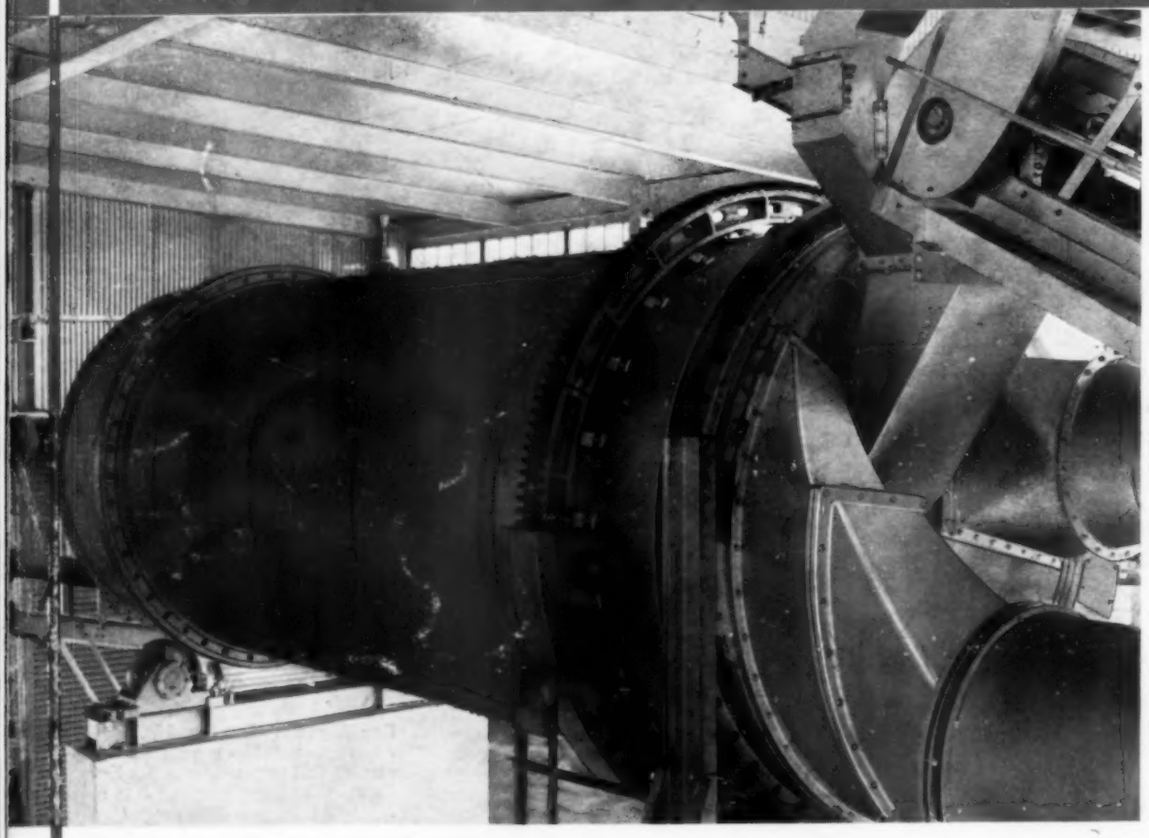
"EVERYTHING FOR A FOUNDRY"

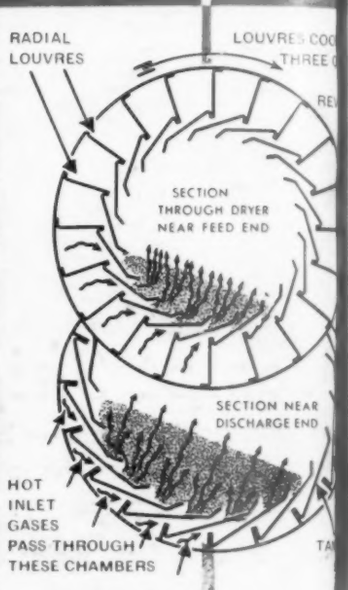
DRY SAND for UNIFORM MIXIN

Accurate and Uniform Control Assured wi

LINK-BELT
ROTO-LOUVRE DRYER



A 10′3″ dia. × 26′0″ long Roto-Louvre Dryer handling 50 to 60 tons of Lake Michigan bank core sand per hour. Heat losses are extremely small and temperature of the sand as discharged from the dryer is low as compared with other methods. These facts prove high efficiency with minimum heat losses.



This diagram indicates the arrangement of louvres within the dryer. Material to be dried passes over louvres in a uniform bed and hot gases enter only through the louvres below the bed of material and are forced with slight pressure to pass directly through the moving mass. A greater volume of hot air penetrates a relatively thin bed of material at the feed end, where greatest evaporation can take place. As the material moves forward the bed becomes thicker and the air passages get smaller, so that a relatively volume of air will penetrate the bed, thus preventing overheating.

THE unique principle on which this dryer operates, enables it to dry core and molding sands at highest efficiency. Many units are now operating in vital war equipment foundries both as dryers and coolers. 8 standard size units for capacities from 1 to 60 tons per hour. Send for Book No. 1911.

SMALL SPACE—LARGE CAPACITY

This unit often requires less than 50% of floor space and frequently less steel per pound of evaporation than conventional-type drying equipment of comparable capacity.

LOW MAINTENANCE

Built for long, continuous service. There are no moving parts within the dryer shell—nothing to get out of order and practically no wear from the abrasive action of material. Gently tumbles and mixes the sand—no sliding. From drive to discharge, this unit is built for trouble-free operation.

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No overheating—sand is discharged at 120° to 135°F., with a moisture content of zero to ½ of 1%.

EQUALLY EFFECTIVE AS A COOLER—The very same features which make it so outstanding as a dryer also enable this unit to perform with unusual ability as a cooler. Maximum cooling capacity is provided in small space.

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8648

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